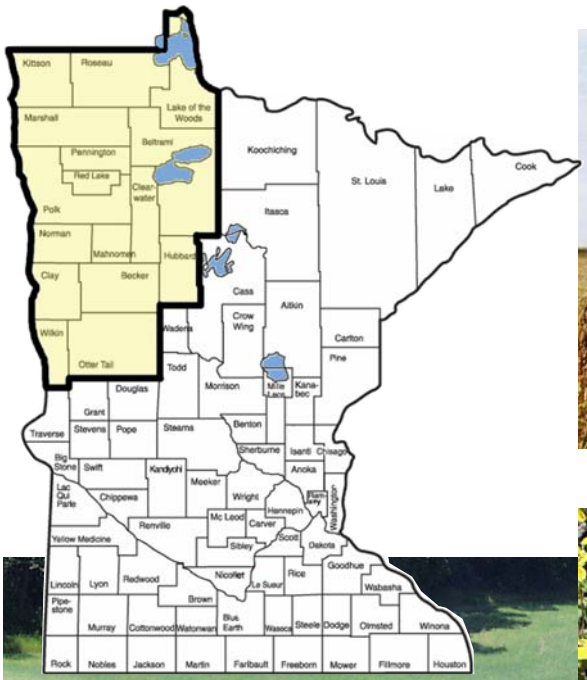
On-Farm Cropping Trials

Northwest and West Central Minnesota

January 2006



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2005 On-Farm Cropping Trials For Northwest and West Central Minnesota

The University of Minnesota is pleased to provide you with the results of the 2005 on-farm field cropping trials conducted in northwest and west central Minnesota.

This is the seventh year for the trials booklet. It was developed to increase the awareness and impact of the many on-farm cropping projects conducted in Minnesota. The booklet contains summary information for projects on a wide range of management issues for corn, soybeans, small grains, and other regional crops.

This project was made possible thanks to the hard work of many people. This includes farmers, County and Regional Extension Educators, and specialists who conducted these trials, and their names are listed. Also, thank you to our task force and our graphic designer, Mary Gieseke.

Whenever possible, research plot data was analyzed using statistics. The LSD (Least Significant Difference) numbers beneath columns in tables are statistical measures of variability. If the differences between two treatments equals or exceeds the LSD value, the higher yielding treatment probably was superior in yield. If the difference is less than the LSD the treatment difference is probably due to environmental factors. An "NS" notation in a column indicates no significant difference for that characteristic.

For more information about any of the studies included in this report, please contact the Extension Educator or specialist listed. We invite your input on priorities you believe are important for Minnesota crop producers.

Sincerely,

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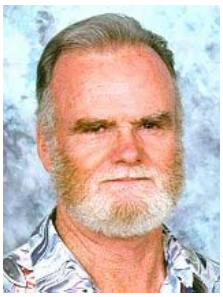

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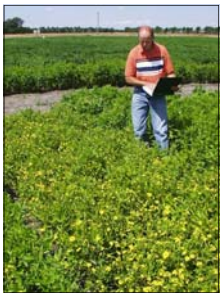

Northwest Research and Outreach Center (NWROC)
Crookston, Minnesota

The mission of the NWROC is to contribute, within the framework of the Minnesota Agricultural Experiment Station (MAES) and the College of Agricultural, Food and Environmental Sciences, to the acquisition, interpretation and dissemination of research results to the people of Minnesota, with application to the knowledge base of the United States and World. Within this framework, major emphasis is placed on research and education that is relevant to the needs of northwest Minnesota, and which includes projects initiated by Center scientists, other MAES scientists and state or federal agencies.

Research Areas

- Agronomy
- Dairy & Beef Science
- Entomology
- Natural Resources
- Plant Pathology
- Soil Science
- Soil & Water Quality
- Small Grains Extension
- Sugarbeets
- Potatoes

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Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Soybean Yield Response when Controlling Threshold Levels of Aphids at Growth Stage R-5

Cooperators: Ray Johnson and Virgil Jons
Nearest Town: Moorhead
Tillage: Conventional
Previous Crop: Wheat
Row width: 30”
Variety: Pioneer 90M60 (RR)
Experimental Design: Randomized Complete Block with sub sampling, with three replications and two locations
Treatments: Applied 8-10-05; chlorpyrifos (16 fl oz/a); esfenvalerate (5.8 fl oz/a); untreated check

Purpose of Study:

The recommended treatment threshold for soybean aphid is 250 aphids per plant. The current university recommendation emphasizes that this number has been a reliable guideline for soybeans at the R-1 (first flower) to R-4 growth stage (full pod). However, at R-5 (beginning seed) the yield response when treating for these population levels of aphids is less predictable, and in earlier studies the yield response is often not substantial enough to recover the input costs.

One challenge to gathering reliable data that reflects the impact of threshold populations reached at the R-5 growth stage has been knowledge of the size of the aphid population prior to observing threshold numbers. The sites selected for this study had been sampled one week prior to reaching the treatment threshold. Earlier observations at the field sites had estimated aphid infestations to be well below treatable numbers. Fields were originally surveyed July 22 to assess population levels of bean leaf beetle present, not a usual situation in the region.

In addition, spider mites were observed on lower canopy leaves during initial field visits. Spider mites have become a problem in the region during hot, dry weather conditions. Mites have also been problems in soybean fields where insecticides have been applied for insect pest problems such as grasshoppers.

The objectives of this study were to:

1. Determine the impact on soybean yield when controlling at the treatment threshold level of soybean aphid when reached at R-5 stage soybeans when aphids were known to be below threshold prior to this growth stage;
2. Observe the effect on spider mite populations following the application of an organophosphate insecticide (chlorpyrifos, Lorsban) or a pyrethroid insecticide (esfenvalerate, Asana)

Results:

Both insecticide treatments resulted in a significant reduction in the aphid populations by 2-DAT (days after treatment) and continued through 5-DAT when compared to the untreated check (Figure 1). Insecticide treatments were not significantly different from one another. It should be noted that the soybean aphid population also began to decline naturally in the untreated check plots during the post-treatment aphid counts. Natural declines in the aphid populations have been observed in the region in previous seasons, often coinciding with late R-5 and R-6 stage soybeans in mid-August.

Partnership/Funding:
Minnesota Soybean Research and Promotion Council

For additional information:
Phillip Glogoza

Soybean Yield Response when Controlling Threshold Levels of Aphids at Growth Stage R-5 *(continued)*

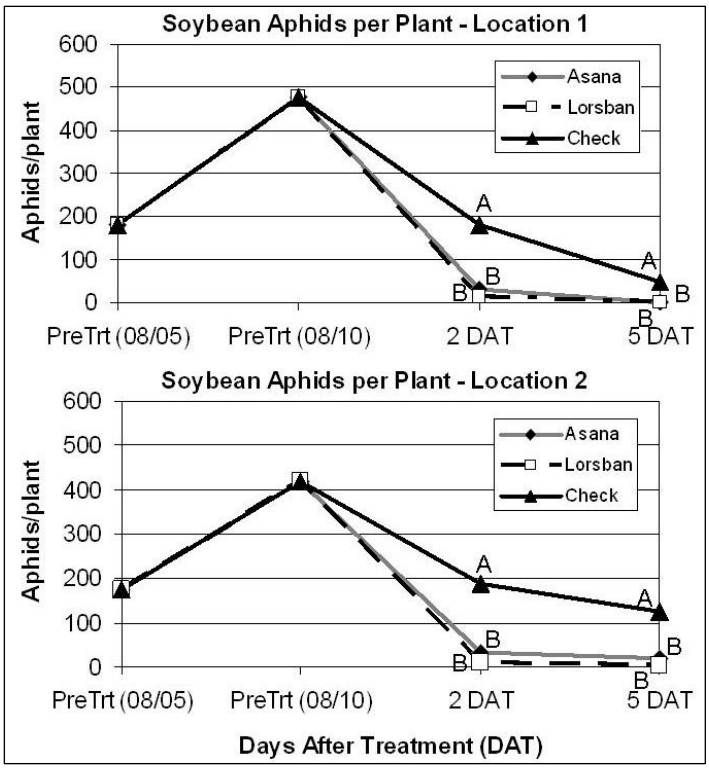


Figure 1. *Mean number of soybean aphids per plant observed from five days prior to insecticide treatments to five days after treatment. Data points by observation day with the same letter are not significantly different from each other. Moorhead, MN, 2005*

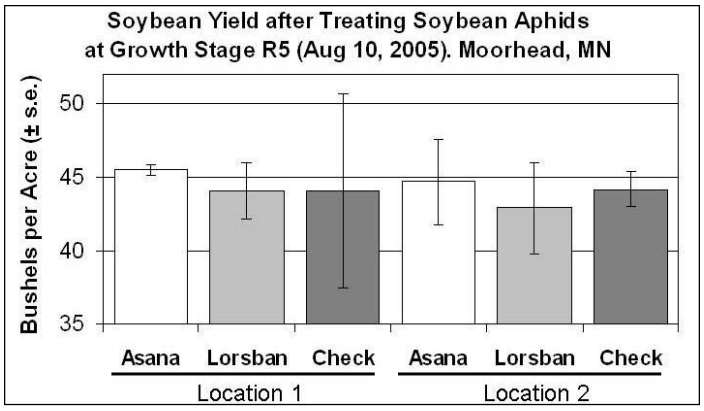


Figure 2. *Soybean yields from two test site locations. Yields were not significantly different from each other. Moorhead, MN, 2005*

Yields were not significantly different between treatments (Figure 2). Reducing the aphid populations with insecticide treatments at this stage did not result in a response that would justify the additional production input in this study. Observed yields in the study were consistent with the 40 bu/acre average and a yield monitor range of 35 to 50 bu/acre reported by the cooperator.

The mite populations at 6-DAT, estimated in the field by counting the number of mites dislodged by tapping a randomly selected leaflet over a clean, white surface until no new mites were observed, responded differently than the aphids. The organophosphate treatment reduced populations to a size that was significantly less than the check and the pyrethroid treatement (Figure 3). The pyrethroid treatment had significantly greater numbers of mites than the untreated check at Location 1. Historically, pyrethroid insecticides have not been good miticides. These results suggest growers be cautious when selecting an insecticide when spider mite populations are present and favorable weather conditions for mites are occurring.

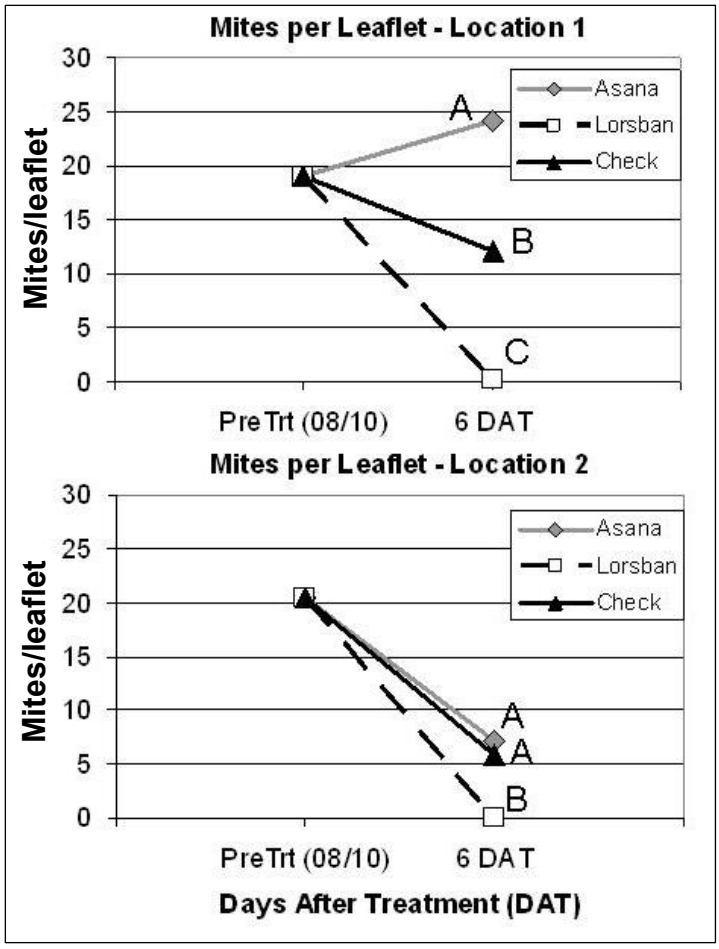


Figure 3. *Mean number of mites per soybean leaflet after treatment with a pyrethroid insecticide (Asana) and an organophosphate insecticide (Lorsban). The data points a 6-DAT followed by the same letter are not significantly different from each other. Moorhead, MN, 2005*

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Soybean Aphid Insecticide Application Timing Study - Otter Tail

Cooperator: Mark Schoening
Nearest Town: Underwood
Soil Type: Sandy Loam
Tillage: None
Previous Crop: Soybeans
Variety: Novartis SO8R4
Planting Date: 5-20-05 (good soil moisture)
Planting Rate Target: 200,000
Row Width: 7.5 inches
Fertilizer: 100 material pounds of 21-0-0-24/a
Herbicide: 5-30-05 Roundup at 2pt/a
7-21-05 Roundup at 1.5 pt/a and CropBooster at 2 pt/a
Insecticide: Warrior at 3 oz., 12 gallons water and 35 psi/a
Treatment Dates: Repeat treated = 6-28, 7-7, 7-20, 8-3, 9-6
R1 = 7-7, R3 = 7-18, R5 = 8-3, R6 = 8-16, R7 = 9-6
Harvest Date: 9-30-05
Experimental Design: Randomized Complete Block (3 replications)
Plot Size: 90 ft. wide by 500 ft. long

Purpose of Study:
To evaluate soybean aphid populations in relation to crop stage and application timing to better understand aphid economic thresholds.

Results:

Insecticide application timing was identified as a critical component in soybean aphid damage control since the 2002 season. NW and WC MN have annually been subjected to "late" season aphid pressure. This research demonstrates significant yield protection with insecticide usage starting at early flowering (R1) and continuing through beginning seed (R5). It also points out, full seed (R6) and beginning maturity (R7) applications are too late to protect yield. Soybean aphid colonies were subjected to heavy rain and wind events throughout the season before naturally declining in numbers towards the end of August. Natural predator populations were continually low across the site.

No significant differences were detected with percent moisture, test weight, pods/plant, pods/node, seed weight, and percent protein measurements.

Treatment	Aphids per Plant						Yield	Node/Plant	Oil
Date Stage	6-28-05 V – 4	7-7-05 R - 1	7-18-05 R - 3	8-2-05 R - 5	8-16-05 R – 6	9-6-05 R - 7	9-30-05 Maturity (bu/a)	9-28-05 Maturity (node/plant)	9-30-05 Maturity (%)
Mult. Treat	11	0	21	25	9	2	44.1	14.6	16.7
R – 1	1	3	0	113	467	88	44.7	15.4	16.9
R – 3	1	2	65	2	72	3	44.9	13.7	17.1
R – 5	2	2	77	355	18	1	46.3	13.4	16.8
R – 6	0	1	98	727	1342	2	42.6	13.3	17.0
R – 7	1	1	47	445	1514	622	41.5	15.4	16.7
Non Treat	0	2	72	285	622	619	41.6	14.4	16.9
LSD 0.10	NS	1.4	NS	NS	447	450	2.3	1.0	0.2

Partnership/Funding:
Minnesota Soybean Research and Promotion Council
NW Research and Outreach Center

For additional information:
Doug Holen Ian MacRae

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Soybean Varietal Trials — Pennington and Roseau County

	Thief River Falls	Roseau
Cooperator	Lyle Olson	Richard Magnuson
Nearest Town	Thief River Falls	Roseau
Soil type	Roliss loam	Zippel very fine sandy loam
Previous crop	Barley	Wheat
Seed Bed prep	cultivation 2x	cultivated 2x
Soil test	20 - 18 - 332 - 62	NA
Fertilizer	25 - 65 - 20 - 1	14 - 67 - 39 - 0
Planting date	5-31-05	5-19-05
Row width	6 inches	6 inches
Seeding depth	3/4 inch	3/4 inch
Seeding rate	190,000 seeds/ a	190,000 seeds/ a
Herbicides	Trust 1.5 pt/a PPI	Prowl 3 pt/a PPI
		Assure II 10 oz/a Applied on 7-14-05
First Frost date	10-5-05	10-5-05

Purpose of Study:
To evaluate visual maturity, maturity, crop height, yield, protein and oil percent of soybean varieties grown in the far northern zone.

Results:
Within the company maturity rating group of 00.6, 00.7 00.8, 00.9 and 0.1 significant differences in visual maturity score were observed. It is important to use the actual maturity date in variety selection. There are significant differences in crop height, yield, protein and oil percent.

Experimental Design: Randomized complete block with 3 replications

Variety	Company Maturity rating	Visual[1] Maturity score Roseau+TRF (1-9)	Maturity[2] date	Crop Height Roseau+TRF (inches)	Yield[2] percent of mean (%)	Protein[2] percent of mean (%)	Oil[2] percent of mean (%)
Colibri	00.3	4.9	9-24-05	22.7	93	101	91
06004RR	00.4	5.9	9-27-05	22.0	106	95	103
PB00425RR	00.4	6.0	9-27-05	21.0	100	96	104
RR50-04	00.4	5.9	9-25-05	22.5	101	101	102
S00-J4	00.4	6.1	9-27-05	19.5	87	98	103
RR Ramsey	00.5	6.3	9-28-05	21.5	94	98	103
RR20-05	00.5	6.1	9-27-05	21.0	97	100	102
W20051RR	00.5	5.7	9-27-05	22.5	102	96	102
X5005R	00.5	6.0	9-25-05	22.0	101	104	98

[1]Visual score is a combined number of three observations: Roseau 9-12-05 and 9-21-05 and Thief River Falls 9-16-05 (representing an observation around the average first killing frost date).

Table continues on following page. See footnotes on that page.

Partnership/Funding:
Minnesota Soybean Research Council

For additional information:
Jim Orf, Hans Kandel, Dave LeGare

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Soybean Varietal Trials — Pennington and Roseau County (*continued*)

Variety	Company Maturity rating	Visual[1] Maturity score Roseau+TRF (1-9)	Maturity[2] date	Crop Height Roseau+TRF (inches)	Yield[2] percent of mean (%)	Protein[2] percent of mean (%)	Oil[2] percent of mean (%)
06006RR	00.6	3.8	9-21-05	19.4	80	99	99
PB00645RR	00.6	7.5	9-27-05	20.2	95	96	102
RR50-06	00.6	4.6	9-21-05	21.2	90	101	99
RR50-07	00.7	8.3	9-30-05	23.8	103	98	103
MN0071	00.7	4.9	9-21-05	21.0	97	99	104
W20077RR	00.7	6.0	9-27-05	22.2	89	100	101
Jim	00.8	5.0	9-24-05	21.2	99	99	89
Atwood	00.8	8.1	9-27-05	22.0	109	105	97
NS0049RR	00.8	7.8	9-26-05	22.3	102	100	104
DSR-C800/RR	00.9	8.1	9-30-05	23.0	110	98	103
DSTC9-000/RR	00.9	6.3	9-28-05	19.8	97	101	102
RR ROYAL	00.9	7.8	9-29-05	21.2	99	99	99
K-009+RR	00.9	8.5	10-1-05	23.2	109	100	102
M-0096	00.9	8.7	9-30-05	21.8	108	100	101
NT-0090RR	00.9	8.5	10-1-05	22.3	104	102	103
04009RR	00.9	7.4	9-29-05	20.8	92	96	103
PB00965RR	00.9	8.3	10-1-05	21.8	102	101	102
Bravado	00.9	5.2	9-25-05	22.2	108	96	103
W20092RR	00.9	8.5	10-2-05	22.7	109	102	102
W20091RR	00.9	7.9	9-30-05	23.2	102	101	100
NS0110RR	00.9	5.3	9-27-05	20.7	102	101	103
NS0099RR	00.9	6.6	9-29-05	20.2	97	99	102
NS0056RR	00.9	6.8	9-29-05	23.5	102	98	102
RG200	0.0	7.0	9-28-05	21.7	91	105	86
Traill	0.0	6.3	9-27-05	22.0	101	106	87
NT-0111RR	0.1	5.8	9-28-05	20.3	102	98	105
NT-0102RR	0.1	7.0	9-30-05	22.7	97	96	100
NT-0121+RR	0.1	7.5	9-28-05	20.9	98	95	102
90M01	0.1	6.8	9-28-05	21.2	94	100	104
PB00943RR	0.1	8.3	9-30-05	22.5	110	99	102
S01-T5	0.1	8.6	9-29-05	23.2	96	108	95
MK0205	0.1	6.8	9-30-05	19.5	92	104	96
T-0222+RR	0.2	8.9	10-3-05	23.5	106	101	101
S02-M9	0.2	8.4	9-30-05	26.1	108	102	101
Mean		6.8	9-28-05	21.8	35.3 bu/a	35.4%	18.3%
LSD 0.05		1.1		3.0			
LSD 0.20					6%		

[1]Visual score is a combined number of three observations: Roseau 9-12-05 and 9-21-05 and Thief River Falls 9-16-05 (representing an observation around the average first killing frost date).

9= Plants green

8= mostly green some yellowing

7= yellowing more than half still green

6 = half yellow half green

5 = mostly yellow limited green

4 = yellow

3 = yellow and browning of pods

2 = plant nearly mature

[2] Data average for far northern zone Roseau, Thief River Falls and Crookston

Source and more information can be found at http://www.soybeans.umn.edu/crop/variety/

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Influence of Roundup Herbicide on Manganese Nutrition of Soybean

Cooperator: Tyler and HD Ross
Nearest Town: Crookston
Soil Type: Bearden silt loam
Tillage: Field cultivator
Previous Crop: Sugarbeets
Variety: Asgrow 0301
Planting Date: 5-17-05
Row Width: 6”
Fertilizer: None
Herbicide: 1 qt. Roundup Original/a
Harvest Populations: 180,000
Harvest Date: 10-4-05
Experimental Design: Randomized complete block

Purpose of Study:

To investigate the influence of glyphosate herbicide on the manganese nutrition of soybean. Previous research from Purdue University indicates manganese deficiency of soybean is induced with the application of roundup on roundup resistant varieties and can be remedied by adding Mn chelate as a foliar treatment.

Results:

Results from the trial at Crookston in 2005 show no influence of roundup inducing manganese deficiency on the roundup resistant variety Asgrow 0301 with respect to yield, protein concentration, oil concentration and Mn uptake in plant material (table 1 & figure 1). Plots were treated with manganese chelate at 0.5 lb. Mn/a 5, 10, 15 & 20 days after roundup herbicide had been applied to soybean. Plant samples were collected and analyzed for manganese concentration at the same intervals allowing 5 days for the Mn to be absorbed by the soybean plant (figure 2). Soybean plant manganese concentration increased by applying manganese chelate 15 and 20 days after roundup application however it did not translate into an increased grain yield or quality of soybean. Our Red River Valley soils are able to supply enough manganese to the soybean plant therefore supplementing with foliar manganese chelate is not needed.

Table 1. Soybean yield, protein % and oil % with and without roundup and Mn.

Treatment	Yield	Protein %	Oil %
No Roundup + No Mn	54.5	33.9	18.0
Roundup + No Mn	51.6	32.9	17.6
Roundup + Mn 5[1](dara)	52.7	33.0	17.9
Roundup + Mn 10(dara)	51.0	33.0	17.6
Roundup + Mn 15(dara)	45.5	33.4	17.9
Roundup + Mn 20(dara)	49.8	33.5	17.9
LSD .05	6.2	1.1	0.3

[1]Days after roundup application.

Figure 1. Soybean grain yields with and without roundup and Mn.

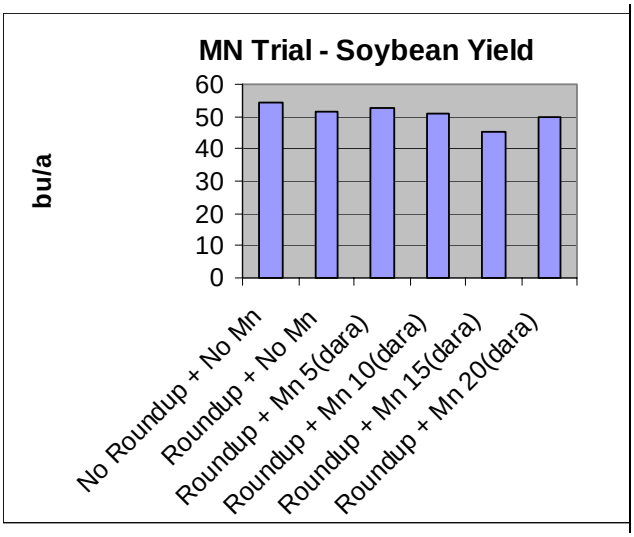
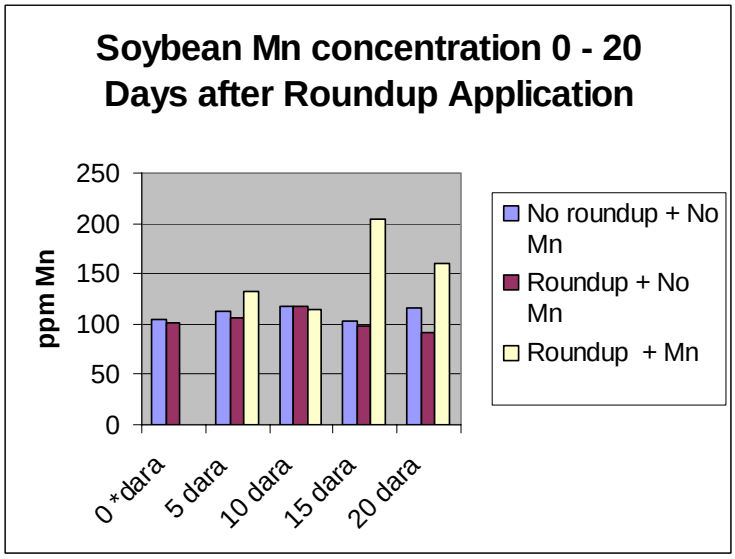


Figure 2. Soybean Mn concentration 0 – 20 days after roundup application.



*Days after roundup application.

Partnership/Funding:
Minnesota Soybean Research and Promotion Council

For additional information:
Russ Severson

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Soybean Conventional and Roundup Ready Varietal Trials McIntosh and Crookston—Polk County

Crookston Site
Tyler & HD Ross

Roundup Ready Varieties

Planting Date: 5-17-05
Seeding Rate: 180,000 plants/a
Soil Test:
P = 11 ppm
K = 274 ppm
O.M. = 3.4%
Carb. = 3.1%
Salts = .66 mmho
pH = 8.2
Herbicides: PPI = None
Conventional—6-10-05
Raptor 4 oz./a
Flexstar 6 oz./a
Prime Oil 1 gal/100 gal
AMS Liquid 1.5 gal/100 gal
Roundup Varieties—6-27-05
1 qt. Roundup Original
Harvest Date 10-1-05

Company	Variety	Yield (bu/a)	Protein (%)	Oil (%)
Asgrow	AG0301	59.0	33.8	18.0
NK Brand	S02-M9	58.4	36.1	18.3
Dyna-Grow	SX05405	58.4	35.7	17.8
Pioneer	90M60	57.6	35.0	18.0
Legend Seeds	0094RR	57.5	34.5	18.0
Asgrow	AG0202	57.0	33.6	17.9
NK Brand	S04-Z9	56.4	35.2	17.7
Wensman Seed	W20051RR	55.2	33.2	18.5
Pioneer	90M20	55.0	33.9	17.9
DeKalb	DKB009-51	54.8	34.7	17.9
Proseed Inc.	RR 50-30	54.7	34.6	18.1
Wensman Seed	W20092RR	54.6	35.2	18.2
Asgrow	AG00603	54.5	32.9	17.8
Stine Seed	S00260-4	54.4	34.2	18.4
Croplan Genetics	RT0043	54.2	33.3	18.5
Stine Seed	S0090-64	53.3	35.3	18.2
Croplan Genetics	RT0103	53.2	35.4	18.2
NK Brand	S01-T5(x402R)	52.4	36.8	17.3
Pioneer	90B51	51.7	35.4	18.3
Proseed Inc.	RR 40-20	51.6	32.7	18.2
Dyna-Grow	34G02	51.3	35.0	18.3
NuTech Seed	NT 0090RR	51.2	35.2	18.2
AgSource Seed	9053	51.0	36.2	18.0
Garst Seed Co.	XR01C88	50.1	34.3	18.1
Hyland Seeds	RR Regal	49.6	34.8	18.2
Wensman Seed	W20077RR	48.5	34.4	18.1
Dyna-Grow	30D09	47.8	34.0	18.2
Seeds 2000	0051RR	47.6	35.0	18.1
Hyland Seeds	RR Ramsey	47.2	35.2	18.2
Legend Seeds	0093RR	46.9	34.6	18.0
Thunder Seeds	23005RR	46.6	36.5	17.4
Peterson Farm Seed	PFS 0303RR	46.4	35.5	18.2
Garst Seed Co.	0095	46.0	36.7	16.9
AgSource Seed	9009RR	44.7	34.1	18.1
Peterson Farm Seed	PFS 04009RR	44.4	34.4	17.8
Peterson Farm Seed	PFS 0502RR	44.1	33.7	18.0
Legend Seeds	0255RR	43.9	33.2	18.0
Proseed Inc.	RR 20-11	41.6	35.7	18.3
Croplan Genetics	RT0273	41.6	33.8	18.0
NuTech Seed	NT 0121+RR	40.8	33.4	17.9
Hyland Seeds	RR Reliant	40.0	36.5	17.8
AgSource Seed	9025RR	39.6	33.4	17.9
LSD .05		[1]4.3	0.6	0.3

[1] Yields that differ by less than 4.3 bu/a are not statistically different from each other.

Partnership/Funding: Polk County Extension Service and Polk County Soybean Growers Association

For additional information:
Russ Severson and Jim Stordahl

Soybean Varietal Trials —Polk County *(continued)*

McIntosh Site
Dewayne Ostenaa

Roundup Ready Varieties

Planting Date: 5-31-05
Seeding Rate: 180,000 plants/a
Soil Test :
P = 8 ppm
K = 70 ppm
O.M. = 3.1%
Carb. = 0.0%
Salts = .15 mmho
pH = 6.6
Herbicides: PPI = Prowl
Conventioal Varieties—6-28-05
Raptor 4 oz./a
Flexstar 6 oz./a
Prime Oil 1 gal/100 gal
AMS Liquid 1.5 gal/100 gal
Roundup Varieties—6-28-05
1 qt Roundup Original
Harvest Date 10-4-05

Company	Variety	Yield (bu/a)	Protein (%)	Oil (%)
Proseed Inc.	RR 20-40	53.9	35.2	18.5
Asgrow	AG0202	47.1	35.0	17.7
Garst Seed Co.	XR01C88	45.3	35.4	18.0
NK Brand	S01-T5(x402R)	44.2	37.1	17.6
Asgrow	AG0301	43.8	34.4	18.0
AgSource Seed	9053	43.0	36.0	18.0
Wensman Seed	W20051RR	42.6	34.4	18.4
Asgrow	AG00603	42.2	34.2	17.6
Proseed Inc.	RR 50-30	41.8	35.4	17.9
NK Brand	S02-M9	41.8	36.8	18.4
Pioneer	90M60	41.6	36.8	17.5
NK Brand	S04-Z9	41.1	36.9	18.0
Pioneer	90M61	40.6	35.5	18.7
Legend Seeds	0094RR	40.4	34.1	18.3
NuTech Seed	NT 0090RR	37.4	36.2	18.2
Stine Seed	S00260-4	37.2	36.7	17.7
Legend Seeds	0255RR	37.0	34.0	18.2
Seeds 2000	0051RR	36.8	36.3	17.8
DeKalb	DKB009-51	36.6	35.3	17.9
Stine Seed	S0090-64	36.5	37.0	17.9
Dyna-Grow	33T06	36.4	36.8	17.4
Dyna-Grow	SX05009	36.4	36.7	18.1
Hyland Seeds	RR Ramsey	36.3	36.5	17.8
Croplan Genetics	RT0273	36.3	35.4	18.0
Pioneer	90B51	36.1	35.6	18.1
NuTech Seed	NT 0121+RR	36.1	34.4	18.1
Wensman Seed	W20077RR	35.6	36.7	17.6
Thunder Seeds	23005RR	35.3	37.3	17.4
Hyland Seeds	RR Reliant	34.6	36.9	17.2
AgSource Seed	9025RR	34.2	34.5	18.1
Croplan Genetics	RT0043	34.1	34.8	18.3
Proseed Inc.	RR 40-20	34.0	34.8	18.0
Peterson Farm Seed	PFS 04009RR	33.6	36.1	17.9
AgSource Seed	9009RR	33.1	35.0	18.2
Dyna-Grow	31F02	33.0	35.5	17.9
Peterson Farm Seed	PFS 0303RR	32.9	36.8	17.8
Croplan Genetics	RT0103	32.8	36.5	18.2
Hyland Seeds	RR Regal	32.5	36.2	17.8
Garst Seed Co.	0095	32.1	36.5	17.3
Wensman Seed	W20092RR	31.9	36.6	18.2
Legend Seeds	0093RR	28.8	36.2	17.9
Peterson Farm Seed	PFS 0502RR	27.8	34.8	18.1
LSD .05		[1]7.4	0.8	0.4

[1] Yields that differ by less than 7.4 bu/a are not statistically different from each other.

Soybean Varietal Trials —Polk County *(continued)*

Conventional Varieties

Crookston Location

Company	Variety	Yield (bu/a)	Protein (%)	Oil (%)
Legend Seeds	0557	53.2	34.3	18.4
Hyland Seeds	Casino	49.7	32.4	18.3
Pioneer	90B43	49.4	33.1	18.5
Legend Seeds	0090	48.8	33.0	18.3
Earthwise	Panther	47.2	37.2	17.2
NDSU	Traill	46.4	37.1	16.8
U of M	MN0304	46.2	35.3	18.1
Thunder Seeds	598	45.1	34.4	18.4
Hyland Seeds	Emerson	42.7	32.8	19.1
U of M	MN0071	40.6	33.6	18.6
Earthwise	Colibri Natto	34.7	34.1	15.8
NDSU	Pembina	33.7	35.0	18.0
LSD .05		[1]6.2	0.6	0.3

[1]Yields that differ by less than 6.2 bu/a are not statistically different from each other.

McIntosh location

Company	Variety	Yield (bu/a)	Protein (%)	Oil (%)
Hyland Seeds	Casino	41.5	34.5	17.9
Hyland Seeds	Emerson	38.5	34.9	18.6
Pioneer	90B43	37.3	35.1	17.9
U of M	MN0304	37.2	35.2	18.2
Thunder Seeds	598	37.0	36.2	17.9
NDSU	Traill	33.8	36.5	17.2
Legend Seeds	0090	33.5	34.2	17.9
Legend Seeds	0557	32.4	36.5	18.0
Earthwise	Panther	32.3	38.2	17.1
U of M	MN0071	28.8	35.2	18.2
Earthwise	Colibri Natto	24.4	35.4	15.7
NDSU	Pembina	23.0	34.9	17.7
LSD .05		[1]7.2	0.5	0.3

[1]Yields that differ by less than 7.2 bu/a are not statistically different from each other.

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Soybean Varietal Trials —Norman County

Cooperator: Skaurud Grain Farms Inc.: Kelly and Perry Skaurud
Nearest Town: Mahnomen
Soil Type: Hamerly-Vallers and Grimstad - Rockwell
Tillage: Fall Chisel plow, Spring cultivator with drag
Previous Crop: Dry Beans
Planting Date: 5-17-05
Row Width: 12 rows 22 inches wide
Fertilizer: 87lb MAP, 42lb Phosphorus
Herbicide: Glyfox X-tra at 1qt/a on 6-17-05, Glyfox X-tra 1 qt/a on 7-06-05
Insecticide: Mustang at 2.25oz./a on 8-03-05
Harvest Populations: 155200
Harvest Date: 9-30-05
Experimental Design: Randomized complete block design

Purpose of Study:
To evaluate the performance of varieties in our soil types and weather conditions.

Results:
A very uniform field resulted in good comparisons of stand count, yield, moisture %, oil %, and protein %

Company	Variety	Mat.	Population 1,000's (plants)	Harvest Moist. (%)	Test Weight (lb/bu)	Protein (%)	Oil (%)	[1]Yield (bu/a)	Ranking
Hyland Seeds	Ramsey	00.5	162	10	57.7	33.8	18.6	45.6	28
Legend Seeds	LS0093	00.9	173	9.8	57.2	34.0	18.1	44.5	30
Hyland Seeds	Royal	00.9	162	9.8	57.0	34.1	18.3	47.8	27
Agsource	9009RR	0.1	183	9.5	57.2	33.5	18.6	45.5	29
Dekalb	DKB009-51	0.2	152	9.9	57.4	33.4	18.0	50.5	19
Croplan Genetics	RT0273	0.2	159	9.5	57.1	32.0	18.5	49.9	22
DynaGro UAP	31F02	0.2	135	9.9	56.8	32.0	18.4	48.8	25
Legend Seeds	LS0255	0.2	159	9.9	57.1	32.0	18.6	51.6	13
Pioneer Seeds	90M20	0.2	171	10	57.6	32.7	18.2	50.8	16
Prarie Brand Seeds	PB-0234	0.3	154	9.5	56.9	32.7	18.3	53.2	10
Thunder Seeds Inc.	2502RR	0.4	154	9.6	56.7	33.4	18.4	49.7	23
Stine Seeds	S0260-4	0.5	169	9.8	56.8	33.0	18.6	51.1	15
Asgrow	AG0301	0.5	145	10.2	57.3	31.3	18.5	50.2	21
Garst Seeds	0443	0.5	147	10.8	57.0	32.9	18.7	48.4	26
DynaGro UAP	SX05405	0.5	152	10.7	57.1	34.1	18.2	52.9	12
Prarie Brand Seeds	PB-0554	0.5	162	10.5	56.8	34.2	18.0	55.0	2
Stine Seeds	S0504-4	0.5	154	9.8	57.1	34.3	17.9	53.0	11
Midwest Seed Genetics	GR0504	0.5	164	10.3	56.7	34.2	18.1	54.6	5
Agsource	9053RR	0.5	138	10.8	56.6	34.5	17.8	50.2	20
Garst Seeds	0549	0.5	178	10.2	56.9	33.3	18.8	55.4	1
Stine Seeds	S0600-4	0.6	150	10	57.9	33.8	17.5	54.8	3
Pioneer Seeds	90M60	0.6	150	9.9	57.1	33.8	17.9	54.8	4
Peterson Farm Seeds	0506RR	0.6	138	10	57.0	33.6	18.8	50.7	17
Legend Seeds	LS0624	0.6	133	10.4	56.6	33.9	18.3	53.7	9
DynaGro UAP	33T06	0.6	152	9.9	56.7	34.2	18.1	54.5	6
Agsource	9065RR	0.6	154	10.1	56.7	34.3	18.1	54.4	7
Pioneer Seeds	90M61	0.6	140	10.1	57.4	33.3	19.2	54.1	8
Asgrow	AG0801	0.8	178	10.6	57.0	33.1	17.8	51.6	14
Midwest Seed Genetics	GR0803	0.8	143	12.2	56.5	34.1	18.3	48.9	24
Garst Seeds	0999	0.9	145	11.7	56.4	34.2	17.4	50.6	18
LSD 0.05					0.7	1.1	0.4	3.5	

[1] Corrected to 13% moisture

For additional information: Ray Bisek and Ken Pazdernik

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Determining Spring Wheat Crop Injury Resulting from Early Season Application of Fungicides and Herbicides: Year 2

Previous Crop: Wheat
Variety: Alsen hard red spring wheat
Planting Date: 5-6-05
Harvest Date: 8-15-05
Experimental Design: Randomized complete block with four replications

Treatments were applied 6-16-05 when plants were at the five leaf growth stage (Feekes 2). Puma (0.5 pt/a) and Bronate Advanced (0.8 pt/a) herbicides were applied either as a tank-mix with a fungicide or before fungicide applications were made. The entire test received an application of Folicur (4 oz/a) at the early flowering growth stage (Feekes 10.51) to manage Fusarium head blight (FHB).

Purpose of Study:
To determine if chemical injury from early season herbicide and fungicide applications (either tank-mixed or applied sequentially) caused reduced crop yield or grain quality issues.

Table 1. Fungicide treatments were either tank mixed or applied sequentially on Alsen hard red spring wheat near Crookston.

			Application Method	
Trt	**Fungicide**	**Rate**	**Tank mixed**	**Sequential**
1	No fungicide	-	-	-
2	Headline	3 oz/a	x	
3	Headline	3 oz/a		x
4	Quilt	7 oz/a	x	
5	Quilt	7 oz/a		x
6	Stratego	5 oz/a	x	
7	Stratego	5 oz/a		x
8	Tilt	2 oz/a	x	
9	Tilt	2 oz/a		x

Table 2. Results from tank-mixed versus sequential application of fungicides with herbicides applied on Alsen hard red spring wheat at approximately the 5 leaf growth stage.

Fungicide Application[1]	Yield (Bu/a)	Protein (%)	Test Wt. (lb/Bu)	DON (ppm)	FHB Index (%)	Injury (%)
Herbicide only	59.6	16.1	60.9	1.4	4.7	1.5
Headline/herbicide tank-mix	62.0	16.1	61.2	1.7	5.5	2.7
Headline sequential	61.4	16.1	61.2	1.5	4.2	1.8
Quilt/herbicide tank-mix	61.5	16.2	61.2	1.3	5.7	2.2
Quilt sequential	61.9	16.2	61.3	1.7	4.4	2.2
Stratego/herbicide tank-mix	61.4	16.2	61.3	1.5	4.8	1.8
Stratego sequential	61.3	16.2	61.1	1.2	4.5	1.5
Tilt/herbicide tank-mix	62.0	16.0	60.9	1.7	5.2	2.0
Tilt sequential	63.2	16.1	61.0	1.3	4.5	1.3
Mean	61.6	16.1	61.1	1.5	4.8	1.9
LSD 0.01	NS	NS	NS	NS	NS	0.9

[1]Tank-mixed treatments: fungicide/herbicide mixture. Sequential treatments: herbicides applied first followed by a fungicide application later the same day.

Results:

Saturated soil and frequent rain events stressed plants prior to and during the time treatments were applied. Reduced crop potential in 2005, compared with 2004, reflect the overly wet environment. Yield results ranged from 63.2 bu/a (Tilt, sequential treatment) to 59.6 bu/a (No fungicide), protein ranged from 16.2 to 16.0%, test weights ranged from 61.3 to 60.9 lb/bu, deoxynivalenol (DON) ranged from 1.7 to 1.2 ppm, and Fusarium head blight indexes (index = incidence x severity/100) ranged from 5.7% (Quilt, tank-mixed) to 4.2% (Headline, sequential application) (Table 2). Less chemical injury was noted in 2005, compared to 2004. However, treatment differences were significant only in 2005. The Headline, tank-mixed treatment resulted in the greatest plant injury, but it wasn't significantly different from three other treatments (Tilt, tank-mixed and both Quilt treatments). Contrast comparisons were significant ($P < 0.05$) between Headline tank-mixed and Headline sequential treatments, as well as for tank-mixed and sequential treatments in general.

Prolonged periods of cool, wet weather early in the growing season are suspected to be a factor in increased plant injury. While plant injury was significantly increased during 2005 using tank-mixed fungicides and herbicides, versus separate applications, there were no significant differences in yield, protein, or test weight results. More specifically, the Headline tank-mixed treatment caused significant plant injury compared to the Headline sequential treatment, but crop yield and quality were not affected.

Note: First test year data (2004) were published in the January 2005 issue of On-Farm Cropping Trials.

Partnership:
NWROC Extension Plant Pathology

For additional information:
Charla Hollingsworth

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Evaluating the Need of Hard Spring Wheat for Micronutrients Red Lake, W. Otter Tail and Polk Counties

Cooperator: Ray Swenson, Oklee; Tom Jennen, Fergus Falls; NWROC, Crookston
Previous Crop: Wheat (Oklee), Soybean (Fergus Falls), Wheat (Crookston)
Planting Date: Oklee (4-22-05), Fergus Falls (4-20-5), Crookston (4-21-05)
Fertilizer:

Micronutrient	Oklee	Fergus Falls	Crookston
Iron (Fe)	12.5 ppm	15.3	5.5
Copper (Cu)	0.7 ppm	1.9	1.1
Manganese (Mn)	15.4 ppm	16.8	13.4
Zinc (Zn)	0.5 ppm	3.1	0.4

Herbicide: Puma + Bronate Advanced
Harvest Date: Oklee (7-29-05), Fergus Falls (7-28-05), Crookston (7-29-05)
Experimental Design: Randomized block

Purpose of study:
To evaluate soil applied and foliar micronutrients on yield and protein content of hard red spring wheat.

Result:
None of the micronutrients had a positive effect on grain yield or protein content.

Table 1. Yield and protein content of hard red spring wheat as affected by soil and foliar application of micronutrients at Oklee

Micronutrient Applied				Method of Application		Method of Application	
				Soil	Foliar	Soil	Foliar
Fe	Cu	Mn	Zn	Yield (bu/a)		Protein (%)	
Yes	Yes	Yes	Yes	58.0	61.3	13.9	14.6
Yes	No	Yes	Yes	53.7	60.3	13.8	15.0
No	Yes	Yes	Yes	61.1	59.7	14.0	14.5
Yes	Yes	No	Yes	61.5	57.9	14.3	14.7
Yes	Yes	Yes	No	59.5	53.4	14.2	15.0
No	No	No	No	56.8	60.5	14.1	14.8

Table 2. Yield and protein content of hard red spring wheat as affected by soil and foliar application of micronutrients at Fergus Falls

Micronutrient Applied				Method of Application		Method of Application	
				Soil	Foliar	Soil	Foliar
Fe	Cu	Mn	Zn	Yield (bu/a)		Protein (%)	
Yes	Yes	Yes	Yes	63.5	66.1	14.9	15.0
Yes	No	Yes	Yes	65.4	62.8	14.9	15.0
No	Yes	Yes	Yes	66.3	61.3	15.3	15.1
Yes	Yes	No	Yes	64.5	56.7	14.8	15.1
Yes	Yes	Yes	No	66.1	51.5	15.0	15.5
No	No	No	No	63.6	58.9	14.9	15.3

Table 3. Yield and protein content of hard red spring wheat as affected by soil and foliar application of micronutrients at Crookston

Micronutrient Applied				Method of Application		Method of Application	
				Soil	Foliar	Soil	Foliar
Fe	Cu	Mn	Zn	Yield (bu/a)		Protein (%)	
Yes	Yes	Yes	Yes	54.7	59.8	15.5	15.0
Yes	No	Yes	Yes	54.7	48.8	15.1	15.2
No	Yes	Yes	Yes	56.9	52.7	14.9	14.2
Yes	Yes	No	Yes	56.2	52.7	15.3	15.1
Yes	Yes	Yes	No	56.6	41.4	15.5	14.7
No	No	No	No	52.9	53.9	15.6	14.6

Partnership: Minnesota Wheat Research and Promotion Council
Northwest Research and Outreach Center

For additional information:
George Rehm, Albert Sims and Russ Severson

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Development of Improved Fusarium Head Blight (FHB) Management Strategies in the Red River Valley Using Aerial Application of Fungicide

Cooperators: Gary and Lori Hoerner of Crookston, Mark Richtsmeier of Hunter, and Pete Carson of St. Thomas

Tillage: Each commercial spring wheat field was managed and harvested by grower-cooperators according to the best management production practices of the farm.

Spring wheat varieties: Polaris at the Crookston site, Briggs at the Hunter site, and Reeder at the St. Thomas site

Planting Date: All three fields were planted during mid- to late-April.

Fungicide: Folicur (tebuconazole) 4 fl oz/a

Experimental Design: Randomized complete block field design that was analyzed as a combined factorial

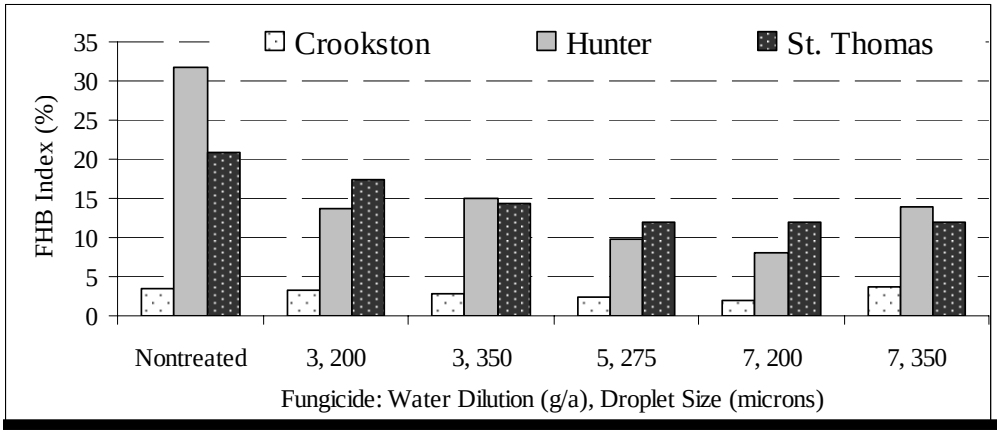
Purpose of Study:

Our objectives were to determine whether aerial fungicide application technologies could be modified in such a way as to increase fungicide deposition on plant tissues by adjusting droplet sizes and dilution volumes for increased disease control using fungicide. The research took place in three spring wheat production fields using a commercial aerial applicator. Test plots were approx. 150' x 1000' to accommodate three fungicide application swaths from the aircraft. Treatments included combinations of two droplet sizes (fine, 200 microns; large, 350 microns) and two fungicide/water dilutions (3 and 7 gallons per acre (g/a)) in addition to a treatment representing the industry standard (275 microns and 5 g/a) (Table 1).

Table 1. Fungicide treatments applied by a licensed aerial applicator.

Trt #	Dilution (g/a)	Droplet size (microns)
1	No fungicide	
2	3	200
3	3	350
4	5	275
5	7	200
6	7	350

Fig. 1. FHB index values (index = incidence x severity/100) for three spring wheat cultivars and locations using aerial application of fungicide with different treatment combinations of fungicide dilutions and droplet sizes.



Results:

Moderate Fusarium head blight (FHB) disease pressure occurred at two of the three experiment locations (Hunter and St. Thomas), while very low pressure FHB severities were recorded at Crookston. All fungicide treatments resulted in less FHB incidence compared with the nontreated control. Those treatments with fine droplet sizes (3 or 7 g/a with 200 µm) resulted in increased grain yield at all test locations over the nontreated control while treatments with larger droplet sizes (5 g/a, 275 µm; 3 or 7 g/a with 350 µm) increased yield at the St. Thomas and Hunter test sites.

Overall, this research establishes that aerial application of fungicide on spring wheat, regardless of droplet size or dilution volume, was of benefit in locations with moderate FHB disease levels. The industry standard treatment (275 µm, 5 g/a) and the '200 µm, 7 g/a' treatment appear to offer a slightly greater and significant level of FHB control (Fig. 1), when averaged over all three locations.

Funded by: U.S. Wheat and Barley Scab Initiative
Partnership: This was a research collaboration between the University of Minnesota and North Dakota State University

For additional information:
Charla Hollingsworth, Marcia McMullen, and Scott Halley

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Red River Valley On-Farm Disease Management Trials of Spring Wheat

Location	Cooperators	Dates		Previous Crop
		Planted (April)	Harvest (August)	
Hallock	Jerry and Carol Olsonawski	21	not harvested	wheat
Strathcona	Jim and Marilyn Kukowski	26	16	wheat
Oklee	Ray and Barbara Swenson	22	15	soybean
Perley	Brian and Theresa Hest	18	13	sunflower
Fergus Falls	Tom and Deb Jennen	20	10	soybean

Purpose of Study:

1. Determine yield and quality responses of several hard red spring wheat varieties when exposed to different environments using common disease management strategies
2. Estimate the resulting economic returns.

Tillage: Each spring wheat field was tilled and fertilized according to the best management production practices of the farm.

Varieties: Alsen, Granite, Knudson, Oxen, Reeder, and Walworth

Experimental Design: Small plots were planted in randomized complete blocks. Treatment mean analysis was done using Duncan's Multiple Range Test (DMRT) rather than the better known Least Significant Different (LSD) Test. This was done to reduce the risk of false positives generated by the LSD test due to the large number of treatments in the study. Results of both tests are interpreted similarly.

Results:

During 2004, leaf rust disease pressure was moderate at the Fergus Falls site while leaf spot diseases and Fusarium head blight (FHB) severities were light at all five experiment locations. During 2005, leaf rust pressure was light overall, but the disease established at the Fergus Falls site late in the growing season. Two diseases, bacterial stripe and FHB were widespread. Disease severities were moderate to severe at all three southern test sites.

Results from test weight, protein, yield, and DON were ranked to compare treatments applied at different crop growth stages (Table 1). Overall, Alsen and Walworth were ranked as top performing varieties for 2004-05 (Table 2).

Economic returns were calculated for each variety and treatment. Figures are based on the cost of fungicide and applications as well as discounts (and premiums) for grade, damage, test weight, protein from a representative grain sample. Discounts were assigned on a worst case scenario (e.g.: if the entire grain delivery was of the same wheat quality and no opportunities existed to blend it at the elevator). The price of wheat was locked in at $3.76/bu when a fictitious "sale" to the elevator was made during mid-November. Table 3 shows economic data means during 2005. Economic data with similar in-depth analyses are not available from the 2004 test.

Table 1. Rank of disease management treatments within variety based on two years (2004-05) of data. Rankings do not indicate statistical significance between treatments or varieties. Larger numbers indicate greater test weight, protein, and yield values and/or lower DON content. Identical ranks within a variety indicate similar test parameter results between treatments. Rank values should not be used for inter-varietal comparisons.

Growth stage of fungicide treatment	Alsen	[1]Granite	Knudson	Oxen	Reeder	Walworth
4-5 leaf	4	2	1	2	2	2
Flag leaf	5	4	3	3	3	4
Early flowering	1	5	4	4	5	4
4-5 leaf followed by early flowering	3	3	4	5	4	3
No fungicide	2	1	2	1	1	1

[1]Data are based on single year results only (2005).

Partnership and Funding Information:
This two year project was funded by the MN Wheat Research and Promotion Council and the Northwest Research and Outreach Center's Extension Plant Pathology Program. It was conducted with support from Dr. Yanhong Dong, Univ. of Minnesota Mycotoxin Laboratory; Jim Tholund, Mid-Valley Grain Co-op; BASF; Bayer CropScience; and Syngenta.

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Red River Valley On-Farm Disease Management Trials of Spring Wheat *(continued)*

Table 2[1]. Two-year data (2004-05) ranking variety and treatment combinations based on results of test weight, protein, yield and deoxynivalenol (DON, Vom) content (16=best rank, 1=lowest rank). Variety/ treatment combinations resulting in similar means across test parameters have the same rank values.

Rank	Variety	Crop growth stage at fungicide application	Rank	Variety	Crop growth stage at fungicide application
16	Alsen	flag leaf	9	Knudson	flag leaf
15	Walworth	early flower	8	Knudson	early flower
15	Alsen	4-5 leaf	8	Reeder	flag leaf
15	Walworth	flag leaf	7	Reeder	4-5 leaf
14	Alsen	4-5 leaf and early flower	6	Knudson	no fungicide
14	Walworth	4-5 leaf and early flower	6	Reeder	no fungicide
13	Alsen	no fungicide	5	Walworth	no fungicide
12	Walworth	4-5 leaf	4	Knudson	4-5 leaf
11	Knudson	4-5 leaf and early flower	4	Oxen	early flower
11	Reeder	early flower	3	Oxen	flag leaf
10	Reeder	4-5 leaf and early flower	2	Oxen	4-5 leaf
9	Oxen	4-5 leaf and early flower	1	Oxen	no fungicide
9	Alsen	early flower			

[1]This information should be used only as a guide. Statistical significance of treatments is not reported.

Table 3. Mean economic[1] analysis of five disease management treatments from six varieties at three experiment sites during 2005. Costs of fungicide and application are included in the calculations to support accurate representation of expected gross income from each treatment. Other normal costs of production (seed, herbicides, fuel, etc.) are not included.

Variety	Disease Management Economic Returns ($/acre)					
	4-5 leaf	Flag leaf	Early flower	4-5 leaf and early flower	No fungicide	Mean
Alsen	$241.88	$241.34	$247.66	$247.13	$235.76	242.75
Granite	$201.07	$197.77	$213.65	$206.28	$209.35	205.62
Knudson	$230.04	$229.33	$212.50	$230.72	$237.11	227.94
Oxen	$202.61	$196.39	$215.18	$211.62	$195.63	204.28
Reeder	$201.40	$192.05	$194.07	$197.35	$174.62	191.90
Walworth	$244.71	$228.64	$254.26	$242.95	$236.33	241.38
Mean	220.29	214.25	222.89	222.68	214.80	218.98

[1]Based on $3.76/bu wheat, discounts were calculated and applied where appropriate (e.g.: grade reductions, damage, test weight, and protein). DON (Vom) discounts did not apply when the (fictitious) grain delivery occurred during November of 2005.

Red River Valley On-Farm Disease Management Trials of Spring Wheat *(continued)*

2005 Red River Valley On-Farm Disease Management Trial Results: OKLEE

Treatment[1] & Variety	DON (ppm)	Protein (%)	Test Wt. (lb/bu)	Yield (bu/a)	Discounts/Premiums[2] ($) Grade	Damage	Protein	Economics[3] ($/a)
1) 4-5 leaf stage								
Alsen	2.3	15.5	61.6	64.3	0.00	-0.04	0.14	$243.17
Granite	2.1	15.6	62.2	59.3	-0.20	-0.10	0.16	$209.56
Knudson	3.1	13.9	60.8	70.8	-0.20	-0.07	0.00	$242.00
Oxen	3.5	14.9	58.1	62.3	-0.30	-0.16	0.08	$205.43
Reeder	5.1	15.2	59.4	61.0	-0.30	-0.20	0.12	$201.22
Walworth	2.0	15.2	60.1	69.0	-0.20	-0.07	0.12	$244.26
Mean	*3.0*	*15.0*	*60.4*	*64.4*	*-0.20*	*-0.11*	*0.10*	*$224.27*
2) Flag leaf								
Alsen	2.6	15.1	62.6	64.5	0.00	-0.04	0.10	$232.27
Granite	1.8	15.8	63.2	60.8	-0.20	-0.07	0.18	$209.14
Knudson	2.6	14.2	61.4	68.6	0.00	-0.04	0.02	$242.60
Oxen	3.7	14.7	58.9	62.5	-0.30	-0.28	0.06	$188.41
Reeder	6.1	15.2	58.0	60.0	-0.30	-0.13	0.12	$192.86
Walworth	2.9	15.0	58.9	65.8	-0.30	-0.13	0.10	$211.63
Mean	*3.3*	*15.0*	*60.5*	*63.7*	*-0.18*	*-0.12*	*0.10*	*$212.82*
3) Early flower								
Alsen	2.5	15.3	62.0	65.5	0.00	0.00	0.12	$240.33
Granite	1.5	16.0	63.4	65.4	0.00	0.00	0.20	$245.02
Knudson	1.0	14.4	62.6	74.7	-0.20	-0.07	0.04	$249.65
Oxen	3.6	15.0	58.5	64.0	-0.30	-0.13	0.10	$205.50
Reeder	4.6	15.1	58.9	60.3	-0.30	-0.16	0.10	$191.06
Walworth	1.7	15.3	59.8	70.7	0.00	-0.04	0.12	$257.37
Mean	*2.5*	*15.2*	*60.9*	*66.8*	*-0.13*	*-0.07*	*0.11*	*$231.49*
4) 4-5 leaf & early flower								
Alsen	1.7	15.5	61.7	70.4	0.00	0.00	0.14	$255.71
Granite	1.0	16.0	63.8	64.8	0.00	-0.04	0.20	$235.10
Knudson	1.6	14.2	62.0	74.2	-0.20	-0.10	0.02	$239.33
Oxen	4.5	14.9	59.8	64.5	-0.30	-0.16	0.08	$199.00
Reeder	5.6	15.3	58.9	63.8	-0.30	-0.20	0.12	$196.64
Walworth	2.2	15.2	60.0	69.6	-0.20	-0.10	0.12	$230.08
Mean	*2.7*	*15.2*	*61.0*	*67.9*	*-0.17*	*-0.10*	*0.11*	*$225.98*
No fungicide								
Alsen	1.9	15.7	62.2	67.9	-0.20	-0.07	0.16	$247.84
Granite	2.4	15.7	62.8	56.9	0.00	-0.07	0.16	$218.97
Knudson	2.6	14.3	60.9	70.3	-0.20	-0.10	0.02	$244.57
Oxen	4.2	15.0	59.1	63.7	-0.30	-0.13	0.10	$218.45
Reeder	4.7	15.0	58.0	56.2	-0.30	-0.20	0.10	$188.96
Walworth	2.1	15.2	60.1	68.8	-0.20	-0.10	0.12	$246.13
Mean	*3.0*	*15.1*	*60.5*	*64.0*	*-0.20*	*-0.11*	*0.11*	*$227.49*
DMRT at 5% level	*1.4*	*0.5*	*1.6*	*6.7*	-	-	-	-
CV	*26*	*2*	*2*	*6*	-	-	-	-

[1]Fungicide treatment product, rate and timing: 1) Tilt, 2 fl oz/a applied at the 4-5 leaf stage; 2) Headline, 6 fl oz/a applied after flag leaf emergence; 3) Folicur, 4 fl oz/a at early flowering; 4) Tilt, 2 fl oz/a at the 4-5 leaf stage and Folicur, 4 fl oz/a at early flowering. All fungicide treatments included 0.125% Induce, a nonionic surfactant.
[2]Grade discounts based on kernel damage and test weights. At the time of analysis there were no market discounts for DON levels.
[3]Wheat marketed at $3.76/bu. Fungicide costs calculated at $5 for treatment #1, $14 for treatment #2, $14 for treatment #3, $19 for treatment #4, and no additional cost for the no fungicide treatment.

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Red River Valley On-Farm Disease Management Trials of Spring Wheat *(continued)*

2005 Red River Valley On-Farm Disease Management Trial Results: PERLEY

Treatment[1] & Variety	DON (ppm)	Protein (%)	Test Wt. (lb/bu)	Yield (bu/a)	Discounts/Premiums[2] ($) Grade	Damage	Protein	Economics[3] ($/a)
1) 4-5 leaf stage								
Alsen	2.1	15.5	60.2	64.9	0.00	-0.04	0.14	$245.66
Granite	5.4	16.2	60.0	60.4	-0.20	-0.10	0.22	$217.39
Knudson	4.6	13.5	57.9	71.4	-0.30	-0.16	-0.06	$226.25
Oxen	4.2	14.7	54.8	58.3	-0.30	-0.13	0.06	$192.53
Reeder	6.0	14.7	56.7	57.4	-0.30	-0.20	0.06	$185.67
Walworth	3.1	14.9	58.0	68.4	-0.20	-0.07	0.08	$239.30
Mean	*4.2*	*14.9*	*57.9*	*63.5*	*-0.22*	*-0.12*	*0.08*	*$217.80*
2) Flag leaf								
Alsen	2.2	15.3	59.5	67.5	0.00	-0.04	0.12	$245.04
Granite	4.9	16.4	60.2	59.6	-0.30	-0.20	0.24	$194.62
Knudson	5.1	13.7	57.7	70.3	-0.30	-0.16	-0.03	$215.91
Oxen	4.1	14.3	55.8	59.5	-0.30	-0.07	0.02	$189.05
Reeder	5.8	14.8	56.0	54.1	-0.30	-0.20	0.08	$166.74
Walworth	3.2	15.3	57.7	64.0	-0.20	-0.07	0.12	$216.87
Mean	*4.2*	*15.0*	*57.8*	*62.5*	*-0.23*	*-0.12*	*0.09*	*$204.70*
3) Early flower								
Alsen	2.7	15.4	59.1	68.8	0.00	0.00	0.14	$254.20
Granite	4.8	15.7	60.2	62.8	-0.30	-0.16	0.16	$203.41
Knudson	3.9	13.8	58.2	55.2	-0.30	-0.13	-0.03	$168.28
Oxen	4.3	14.7	56.6	63.4	-0.20	-0.07	0.06	$210.97
Reeder	6.9	14.6	56.7	55.4	-0.30	-0.13	0.06	$173.80
Walworth	2.6	14.6	58.7	70.9	-0.20	-0.10	0.06	$235.71
Mean	*4.2*	*14.8*	*58.2*	*62.8*	*-0.22*	*-0.10*	*0.08*	*$207.73*
4) 4-5 leaf & early flower								
Alsen		2.1	14.9	59.8	65.8	0.00	-0.04	0.08
Granite	4.3	15.2	59.9	62.1	-0.20	-0.10	0.12	$203.21
Knudson	4.0	13.7	58.1	73.7	-0.30	-0.13	-0.03	$224.34
Oxen	4.5	14.5	56.2	66.9	-0.30	-0.10	0.04	$208.30
Reeder	6.3	15.3	57.3	60.0	-0.30	-0.20	0.12	$183.87
Walworth	2.9	14.8	57.7	72.3	0.00	-0.04	0.08	$255.58
Mean	*4.0*	*14.7*	*58.1*	*66.8*	*-0.18*	*-0.10*	*0.07*	*$217.73*
No fungicide								
Alsen	2.5	15.3	60.0	60.4	-0.20	-0.07	0.12	$217.97
Granite	4.5	15.9	60.3	60.4	-0.20	-0.10	0.18	$219.75
Knudson	4.7	13.6	57.8	72.0	-0.30	-0.16	-0.06	$233.33
Oxen	3.8	14.7	54.1	49.5	-0.50	-0.10	0.06	$159.29
Reeder	7.1	14.4	54.6	45.0	-0.30	-0.16	0.04	$150.28
Walworth	2.6	14.8	57.9	58.9	-0.20	-0.10	0.08	$208.52
Mean	*4.2*	*14.8*	*57.4*	*57.7*	*-0.28*	*-0.12*	*0.07*	*$198.19*
DMRT at 5% level	*1.4*	*0.8*	*1.4*	*14.0*	*-*	*-*	*-*	*-*
CV	*19*	*3*	*1*	*12*	*-*	*-*	*-*	*-*

[1]Fungicide treatment product, rate and timing: 1) Tilt, 2 fl oz/a applied at the 4-5 leaf stage; 2) Tilt, 4 fl oz/a applied after flag leaf emergence; 3) Folicur, 4 fl oz/a at early flowering; 4) Tilt, 2 fl oz/a at the 4-5 leaf stage and Folicur, 4 fl oz/a at early flowering. All fungicide treatments included 0.125% Induce, a nonionic surfactant.

[2]Grade discounts based on kernel damage and test weights. At the time of analysis there were no market discounts for DON levels.

[3]Wheat marketed at $3.76/bu. Fungicide costs calculated at $5 for treatment #1, $14 for treatment #2, $14 for treatment #3, $19 for treatment #4, and no additional cost for the no fungicide treatment.

Red River Valley On-Farm Disease Management Trials of Spring Wheat *(continued)*

2005 Red River Valley On-Farm Disease Management Trial Results: FERGUS FALLS

Treatment[1] & Variety	DON (ppm)	Protein (%)	Test Wt. (lb/bu)	Yield (bu/ac)	Discounts/Premiums[2] ($) Grade	Damage	Protein	Economics[3] ($/a)
1) 4-5 leaf stage								
Alsen	2.2	16.1	63.7	65.5	-0.20	-0.07	0.20	$236.80
Granite	3.8	16.7	60.5	52.1	-0.30	-0.24	0.26	$176.27
Knudson	4.1	14.3	59.9	68.3	-0.30	-0.16	0.02	$221.89
Oxen	2.0	15.5	57.5	59.7	-0.20	-0.10	0.14	$209.86
Reeder	5.3	15.3	58.6	62.1	-0.20	-0.10	0.12	$217.32
Walworth	1.4	15.7	60.1	70.6	-0.20	-0.10	0.16	$250.59
Mean	*3.1*	*15.6*	*60.0*	*63.1*	*-0.23*	*-0.13*	*0.15*	*$218.79*
2) Flag leaf								
Alsen	2.7	16.1	61.7	66.5	0.00	-0.04	0.20	$246.72
Granite	3.4	16.6	61.9	57.2	-0.30	-0.16	0.26	$189.56
Knudson	3.9	14.6	60.3	69.2	-0.20	-0.10	0.06	$229.49
Oxen	2.8	15.5	58.8	65.6	-0.30	-0.16	0.14	$211.71
Reeder	4.2	15.7	59.7	63.7	-0.20	-0.10	0.16	$216.55
Walworth	1.6	15.8	60.5	74.0	-0.20	-0.07	0.18	$257.41
Mean	*3.1*	*15.7*	*60.5*	*66.0*	*-0.20*	*-0.11*	*0.17*	*$225.24*
3) Early flower								
Alsen	2.4	16.0	62.1	67.0	0.00	-0.04	0.20	$248.47
Granite	3.7	17.0	61.6	58.0	-0.30	-0.20	0.30	$192.51
Knudson	3.6	14.4	60.0	66.2	-0.20	-0.07	0.04	$219.57
Oxen	2.9	15.6	58.9	67.1	-0.20	-0.10	0.16	$229.06
Reeder	4.1	15.8	59.7	63.6	-0.20	-0.10	0.18	$217.35
Walworth	1.3	16.0	60.4	72.4	0.00	-0.04	0.20	$269.72
Mean	*3.0*	*15.8*	*60.4*	*65.7*	*-0.15*	*-0.09*	*0.18*	*$229.44*
4) 4-5 leaf & early flower								
Alsen	2.2	16.1	62.3	69.8	0.00	-0.04	0.20	$254.58
Granite	3.8	16.7	60.2	57.3	-0.30	-0.24	0.26	$180.53
Knudson	3.3	14.4	60.6	70.7	-0.20	-0.10	0.04	$228.48
Oxen	2.6	15.5	59.5	67.9	-0.20	-0.07	0.14	$227.56
Reeder	5.6	16.2	59.0	64.9	-0.30	-0.13	0.22	$211.53
Walworth	1.9	15.9	59.8	71.4	-0.20	-0.07	0.18	$243.19
Mean	*3.2*	*15.8*	*60.2*	*67.0*	*-0.20*	*-0.11*	*0.17*	*$224.31*
No fungicide								
Alsen	2.6	16.0	62.1	61.6	0.00	-0.04	0.20	$241.46
Granite	4.5	16.7	61.4	53.2	-0.30	-0.16	0.26	$189.33
Knudson	3.8	14.3	60.1	67.1	-0.20	-0.10	0.02	$233.43
Oxen	2.6	15.2	56.8	57.9	-0.20	-0.07	0.12	$209.15
Reeder	3.7	15.5	56.7	53.7	-0.30	-0.16	0.14	$184.62
Walworth	1.5	15.3	60.4	70.5	-0.20	-0.07	0.12	$254.33
Mean	*3.1*	*15.5*	*59.6*	*60.7*	*-0.20*	*-0.10*	*0.14*	*$218.72*
DMRT at 5% level	*1.6*	*0.6*	*1.9*	*6.5*	-	-	-	-
CV	*30*	*2*	*2*	*6*	-	-	-	-

[1]Fungicide treatment product, rate and timing: 1) Tilt, 2 fl oz/a applied at the 4-5 leaf stage; 2) Tilt, 4 fl oz/a applied after flag leaf emergence; 3) Folicur, 4 fl oz/a at early flowering; 4) Tilt, 2 fl oz/a at the 4-5 leaf stage and Folicur, 4 fl oz/a at early flowering. All fungicide treatments included 0.125% Induce, a nonionic surfactant.

[2]Grade discounts based on kernel damage and test weights. At the time of analysis there were no market discounts for DON levels.

[3]Wheat marketed at $3.76/bu. Fungicide costs calculated at $5 for treatment #1, $14 for treatment #2, $14 for treatment #3, $19 for treatment #4, and no additional cost for the no fungicide treatment.

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Aster Yellows and Barley Yellow Dwarf Diseases in Small Grains

Cooperator: MN Department of Agriculture Plant Pest Survey and Biological Control Program

Purpose of Study:

Determine aster yellows and barley yellow dwarf disease distributions on small grains in the Red River Valley.

Results:

Aster Yellows. During 2003, aster yellows infected small grains plants were confirmed in all 19 counties where commercial fields were surveyed (Fig. 1). Most of the 272 surveyed fields were planted to wheat (255), but barley (15) and oat (2) were represented to a lesser extent. Aster yellows diseased plants were detected in about half of the wheat fields, 73% of the barley and both of the oat fields. During 2004, a total of 835 fields were surveyed. Diseased plants were confirmed from 13 of 17 counties (Fig. 2). Approximately 10% of the wheat fields were diseased and 12.5% of barley. None of the five oat fields were diseased.

Barley Yellow Dwarf. During 2003, seven of 272 fields (2.6%) were identified to have barley yellow dwarf diseased plants. The virus was not detected from any surveyed fields during 2004.

This two-year small grains survey indicates that aster yellows is a more consistent disease issue in the Red River Valley compared with barley yellow dwarf. Disease symptoms of aster yellows are easily confused with those of barley yellow dwarf, making the accuracy of past disease diagnoses of barley yellow dwarf questionable.

Fig. 1. Minnesota counties surveyed during 2003. Counties confirmed positive for aster yellows (gray) and counties not surveyed (white). The disease was detected in at least one field in all counties surveyed.

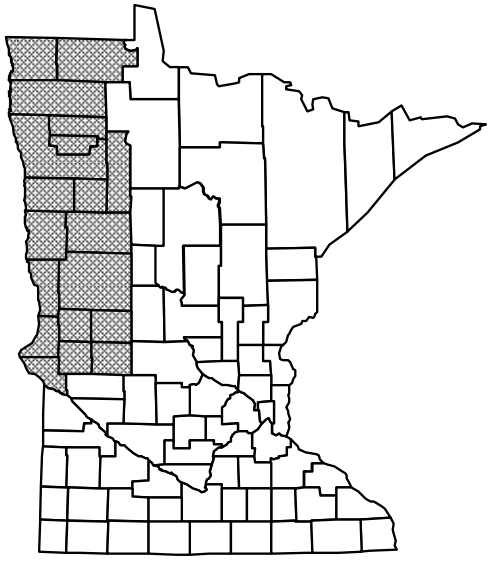
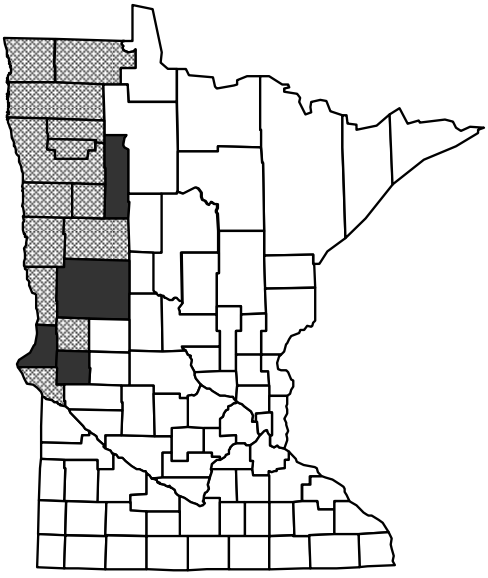


Fig. 2. Minnesota counties surveyed during 2004. Map illustrates counties confirmed positive for aster yellows (gray), negative for aster yellows (black), and counties not surveyed (white).



Partnership or funding information:
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Red River Valley On-Farm Yield Trials—Spring Barley

About the Trials:
The 2005 Red River Valley On-Farm Yield Trials were grown in 5 locations throughout the northwest region. The locations, cooperators, and planting dates are summarized in Table 1. Unfortunately, the two northern locations were abandoned as result of the prolonged wet conditions.

About the Entries:
The entries of the 2005 Red River On-Farm Yield Trials, including the breeder and the year of release, are listed in Table 2. Stellar, a new 6-row malting barley released by NDSU, was added to the trials. AMBA approved Tradition as a malting barley.

Interpretation of the Data:
One-year, two and three-year averages are reported. Within the table, the varieties are listed alphabetically. No single location data is presented to avoid misinterpretation of data. Single environment data has to be interpreted with caution. Performance data across multiple environments; single location/multiple years, or multiple locations/single year, and/or a combination of years and locations is more reliable. Performance data of individual locations is only available upon request. No data may be reproduced without written consent of the author.

In each table, the highest performer for each trait is printed in bold. The grain yield in each table is expressed as a percentage of the trial mean with the overall mean in bu/a listed below. Presenting the data this way allows for better comparisons over years. Secondly, variety selection is based on the relative ranking of the cultivars, rather than the absolute yield. Comparisons between varieties should only be made within each column and not between columns or between tables. In addition to the overall mean for the trial, the Least Significant Difference is printed at the bottom of each column. The LSD is calculated using an alpha level of 5%. This indicates, if and when the observed difference between two varieties is larger than LSD unit that with 95% confidence the observed difference is a real difference rather than experimental error.

Table 1. Locations of the 2005 Red River Valley On-Farm Yield Trials.

Location	Cooperator	Planting Date	Harvest Date
Fergus Falls	Tom Jennen	4-20-05	7-28-05
Perley	Brian Hest	4-18-05	7-28-05
Oklee	Ray Swenson	4-22-05	7-29-05
Strathcona	Jim Kukowski	4-26-05	-
Humboldt	Gerald Olsonowski	4-21-05	-

For additional information:
Jochum Wiersma

Red River Valley On-Farm Yield Trials—Spring Barley *(continued)*

Table 2. Spring barley entries on the Red River Valley On-Farm Yield Trials (2003-2005)

Breeder	Cultivar	Type	Year Released	2003	2004	2005
Anheuser Busch	Legacy[1]	6-row	2000	x	x	x
	Tradition[1]	6-row	2004		x	x
NDSU	Conlon[1]	2-row	1995	x	x	x
	Drummond[1]	6-row	2000	x	x	x
	Stellar	6-row	2005			x
Univ. of Minnesota	Robust[1]	6-row	1983	x	x	x
	Lacey[1]	6-row	2000	x	x	x

[1] AMBA approved malting barley cultivars.

Table 3. Grain yield expressed as a percentage of the trial mean across locations for 2005 and multi-year (2003-2005) comparisons and agronomic characteristics of cultivars entered in the Red River Valley On-Farm Yield Trials.

Cultivar	Across All Locations							
	Grain Yield			3-Year Data				
	1 year	2 year	3 year	Plant Height	Lodging[2]	Plump	Test Weight	Protein
	--------- (% of mean) ----------			(inches)	(1-9)	(%)	(lb/bu)	(%)
Conlon[1]	88.0	86.7	89.0	30.6	6.1	89.2	**47.6**	13.1
Drummond[1]	**107.1**	102.5	99.9	33.8	**4.2**	88.4	45.3	13.2
Lacey[1]	103.2	**107.3**	**105.4**	32.9	4.3	**90.1**	46.3	13.4
Legacy[1]	98.6	103.5	104.5	34.1	4.3	86.2	43.6	**13.0**
Robust[1]	93.9	93.9	93.6	35.8	4.6	87.9	45.4	13.5
Stellar	94.2	-	-	-	-	-	-	-
Tradition	101.4	99.7	-	-	-	-	-	-
CV	9.4	8.2	7.2	8.1	38.3	3.7	2.6	3.9
LSD 0.05	12.5	6.8	4.4	1.7	1.1	2.0	0.7	0.3
Mean	96.1	109.6	120.7	33.1	4.5	87.9	45.6	13.2

[1] AMBA approved malting barley cultivars.
[2] 1=erect and 9=flat

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Red River Valley On-Farm Yield Trials—Spring Wheat

About the Trials:
The 2005 Red River Valley On-Farm Yield Trials were grown in 5 locations throughout the northwestern Minnesota. The locations, cooperators, and planting dates are summarized in Table 1. Unfortunately, the two northern locations were abandoned as result of flooding and prolonged wet conditions.

About the Entries:
The entries of the 2005 Red River On-Farm Yield Trials, including the breeder and the year of release, are listed in Table 2. Testing of 'Verde' was discontinued. New releases that were added to the test included Banton, Buck Pronto, Express, Glenn, Saturn, and Ulen.

Interpretation of the Data:
One-, two-, and three-year averages for grain yield are reported. Within the table, the varieties are listed alphabetically. No single location data is presented to avoid misinterpretation of data. Single environment data has to be interpreted with caution. Performance data across multiple environments, either single location/multiple year, or multiple location/single year, and/or a combination of years and locations is more reliable. Performance data of individual locations is only available upon request. No data may be reproduced without written consent of the author.

In each table, the highest performer for each trait is printed in bold. The grain yield in each table is expressed as a percentage of the trial mean with the overall mean in bu/A listed below. Presenting the data this way allows for better comparisons over years. Secondly, variety selection is based on the relative ranking of the cultivars, rather than the absolute yield. Comparisons between varieties should only be made within each column and not between columns or between tables. In addition to the overall mean for the trial, the Least Significant Difference (LSD) is printed at the bottom of each column. The LSD is calculated using an alpha level of 5%. This indicates that, if and when the observed difference between two varieties is larger than the LSD unit, with 95% confidence the observed difference is a real difference rather than experimental error.

Table 1. Location of the 2005 Red River Valley On-Farm Yield Trials.

Location	Cooperator	Planting Date	Harvest Date
Fergus Falls	Tom Jennen	4-20-05	7-28-05
Perley	Brian Hest	4-18-05	7-28-05
Oklee	Ray Swenson	4-22-05	7-29-05
Strathcona	Jim Kukowski	4-26-05	-
Humboldt	Gerald Olsonowski	4-21-05	-

For additional information:
Jochum Wiersma

Red River Valley On-Farm Yield Trials—Spring Wheat *(continued)*

Breeder	Cultivar	Year Released	2003	2004	2005
AgriPro Wheat	Norpro	2000	x	x	x
	Hanna	2001	x	x	x
	Knudson	2001	x	x	x
	Freyr	2005		x	x
NorthStar Genetics	Mercury	1998	x	x	x
	Polaris	2005		x	x
	Saturn	2005			x
NDSU	Parshall	1999	x	x	x
	Reeder	1999	x	x	x
	Alsen	2000	x	x	x
	Dapps	2003		x	x
	Steele-ND	2004		x	x
	Glenn	2005			x
SDSU	Oxen	1996	x	x	x
	Walworth	2000	x	x	x
	Briggs	2002	x	x	x
	Granger	2004		x	x
Trigen Seed Services	Banton	2004			x
	Buck Pronto				x
Univ. of Minnesota	Oklee	2003	x	x	x
	Ulen	2005	x	x	x
WestBred	Granite	2001	x	x	x
	Express	1997			x
	Trooper	2005			x

Table 2.
Hard Red Spring Wheat entries in the Red River On-Farm Yield Trials (2003-2005).

Cultivar	*Across All Locations*						
	Grain Yield			3-Year data			
	1 year	2 year (% of mean)	3 year	Plant Height (inches)	Lodging[1] (1-9)	Test Weight (lb/bu)	Protein (%)
Alsen	98.6	97.3	98.3	34.4	2.6	61.6	14.5
Banton	94.1	-	-	-	-	-	-
Briggs	103.5	99.6	-	35.3	3.8	62.4	14.3
Dapps	96.5	91.0	-	39.0	3.0	60.9	**15.8**
Express	97.6	-	-	-	-	-	-
Freyr	**113.8**	102.1	-	-	-	-	-
Glenn	108.9	-	-	-	-	-	-
Granger	109.6	107.7	-	-	-	-	-
Granite	83.2	93.4	95.5	32.6	**1.1**	62.6	15.2
Hanna	96.6	95.1	97.0	39.5	2.9	62.2	14.6
Knudson	113.3	105.8	**106.5**	33.2	3.1	61.8	13.6
Mercury	111.4	104.3	104.6	**30.7**	3.0	60.5	13.5
Norpro	92.9	97.2	100.3	32.5	2.8	59.3	13.8
Oklee	108.2	99.4	103.0	33.6	3.1	**63.2**	14.6
Oxen	98.2	97.7	104.0	32.9	2.9	60.3	13.9
Parshall	88.8	87.6	91.8	38.9	2.8	62.0	14.6
Polaris	109.4	**107.2**	-	-	-	-	-
Reeder	93.5	95.9	99.3	34.9	2.5	60.7	14.4
Saturn	105.6	-	-	-	-	-	-
Steele-ND	106.2	99.2	-	-	-	-	-
Trooper	105.2	103.3	-	-	-	-	-
Ulen	109.2	102.1	105.0	35.2	4.0	61.3	14.5
Walworth	111.8	100.5	102.5	36.4	4.8	60.6	14.3
C.V.	8.0	7.5	8.0	4.6	35.0	1.7	3.0
LSD 0.05	15.5	7.3	6.0	1.2	1.0	0.8	0.3
Mean	60.3	78.1	79.0	34.9	3.0	61.4	14.4

Table 3:
Grain yield expressed as a percentage of the trial mean across all locations 2005 and multi-year (2002-2005) comparisons and agronomic characteristics of cultivars entered in the Red River Valley On-Farm Yield Trials.

[1] Lodging score 1 = erect and 9 = flat.

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Irrigated Corn Silage Hybrid Performance Evaluation—Otter Tail

Cooperator: Dan Dreyer
Nearest Town: Ottertail City
Soil Type: Loamy Sand
Tillage: Disk and Chisel Plow
Previous Crop: Corn (150 bu/a)
Hybrid: Various (13 entries)
Planting Date: 5-2-2005 (good soil moisture)
Planting Rate Target: 30,628 seeds/a – standard disk 9# vacuum pressure
Row Width: 30 inches
Fertilizer: 8000 gallons of dairy manure spring applied
Approximately 240 units of Nitrogen
Herbicide: Pre-emergence=Dual II Magnum
Distinct at 4 to 5 leaf stage
Insecticide Treatments: Planter Box Applied "Agrox"
Harvest Date: 9-17-05
Circular harvest pattern using 3 row pull behind chopper into dump box and transported with 2 grain trucks. Weights taken at farm with platform scale. Chopper has kernel processor. Cutting height of 12 inches.
Experimental Design: Randomized Complete Block (3 replications)

Relative maturity (RM), whole-plant moisture(moist), silage yield and quality traits for corn hybrids planted at Ottertail, MN (Otter Tail County) in 2005.

Brand/Hybrid Entry	RM Rating	Moist (%)	Yield [1] DM (Ton/a)	Yield [1] Silage (Ton/a)	Quality (concentration) [2] CP (%)	NDF (%)	IVD (%)	NDFD (%)	Starch (%)	Milk Yield [3] Ton (lb/ton)	Milk Yield [3] Acre (lb/a)
Pioneer 38H69	100	66.6	6.3	19.0	7.7	39	81	52	35	3,520	22,300
Dekalb DKC 42-95	92	63.9	6.1	17.0	7.1	37	81	50	40	3,610	22,100
Pioneer 37R70	99	64.9	6.1	17.4	8.0	38	82	51	36	3,570	21,800
Dyna Gro CX05798	98	62.8	6.7	17.9	7.2	42	79	49	33	3,260	21,700
Hyland HLS058	101	66.7	6.7	20.0	7.8	42	79	50	31	3,250	21,700
Pioneer 38W22	92	62.8	6.1	16.4	7.5	38	81	51	35	3,490	21,300
Nu Tech QFO193	93	63.8	6.6	18.3	7.1	43	77	48	32	3,170	21,000
Pioneer 37A92	97	62.6	5.8	15.5	7.9	37	82	52	37	3,580	20,800
Dekalb DKC 40-05	90	63.7	6.0	16.5	7.2	40	79	48	35	3,380	20,200
Nu Tech QFO100	100	69.7	6.4	21.0	7.4	44	79	52	27	3,130	19,900
Dyna Gro 55F53	102	67.0	6.3	19.0	7.2	43	77	45	33	3,120	19,600
NK Seeds N33-H6	93	68.6	6.3	20.2	7.3	44	78	50	27	3,090	19,600
Hyland HLS009	73	52.7	6.0	12.7	7.4	39	80	48	35	3,220	19,300
Mean		64.3	6.3	17.8	7.4	40	80	50	33	3,340	20,900
LSD 0.10		2.0	NS	2.2	0.4	3	2	2	3	180	NS

[1] DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.
[2] Quality concentration desciption expressed as a % of DM, except NDFD which is expressed as a % of NDF.
[3] Milk production was estimated using spreasheet MILK2000 developed at the University of Wisconsin.

Partnership: U of MN Forage Program
Funding: Private Seed Companies

For additional information:
D. Holen V. Crary P. Peterson
C. Sheaffer D. Swanson J. Halgerson

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Corn Variety Yield Study—Norman County

Cooperator: Lynn Johnson
Nearest Town: Ada
Soil Type: Bearden-Colvin and Fargo silty clay loam
Tillage: Fall chisel plow, spring cultivator with drag
Previous Crop: Sugarbeets
Planting Date: 4-25-05
Row Width: 12 rows, 22 inches wide, Approx 700 feet long
Fertilizer: Fall 110 lb 46-0-0
Spring with planter 5.5 gal. of 10-34-0 with 1qt./a zinc
Herbicide: Roundup Ultra Max at 22oz./a on 6-13-05
Harvest Populations: 25752/a an average of all varieties
Harvest Date: 10-28-05
Experimental Design: Randomized complete block design replicated three times

Purpose of Study:
Evaluate different corn hybrids for stand, harvest moisture, test weight and yield.

Results:
The field was not very uniform and field results were variable. Over 13 inches of rain fell during May and June.

Companies	Corn Hybrid	Harvest Stand Count (1000/a)	Harvest Moisture (%)	Test Weight (lb/bu)	[1]Yield (lb/a)
Hyland	BixxioRR	28.7	17.3	59.0	113.1
Legend Seeds	9579	19.7	18.9	58.3	97.8
Hyland Seeds	HLB25R	25.0	21.7	55.2	137.4
Legend Seeds	9482	23.3	19.8	55	131.4
Pioneer Seeds	39H86	20.7	19.0	56.5	120.6
Legend Seeds	9483	24.7	22.0	53.1	120.0
Agsource	2661	31.0	21.0	53.8	142.0
Midwest Seed Genetics	6925RB	25.3	26.7	50.7	128.2
Peterson Farm Seeds	24H82	20.3	19.7	53.8	118.8
Pioneer Seeds	39D80	30.7	19.9	54.3	146.5
Agsource	2766	30.7	19.5	54.1	136.2
DynaGro UAP	51P15	30.3	20.5	54.1	157.3
Peterson Farm Seeds	36ce85	15.0	21.6	54.4	95.1
Midwest Seed Genetics	2S115	29.0	23.9	53.5	137.6
DynaGro UAP	51P33	27.7	21.1	55.0	149.4
Dekalb	DKC35-02	28.0	19.8	53.7	119.1
Croplan Genetics	238	23.3	22.1	53.2	130.2
DynaGro UAP	51P64	22.7	18.4	54.4	125.7
Dekalb	DKC37-14	31.0	19.3	55.2	141.2
Pioneer Seeds	39D85	25.0	19.4	54.7	142.0
Dekalb	DKC40-07	28.7	22.5	51.9	137.7
LSD 0.05		5.0	1.7	1.3	29.9

[1]Corrected to 15.5% moisture

For additional information:
Ray Bisek and Ken Pazdernik

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Alfalfa Variety Trial—Otter Tail County

Cooperator: John Wold
Nearest Town: Underwood
Previous Crop: RR Corn
Varieties: Various (19 entries)
Planting Date: 5-6-04 (good soil moisture)
Emergence Date: 5-17-04
Planting Rate Target: 15 Lbs. PLS/a
Row Width: 6 inches
Fertilizer: Heavy Dairy Manure in Spring 2003
Herbicide: 6-8-04 Raptor 4oz. + NIS .25%
Harvest Dates 2004: 6-8-05and 9-3-05
Harvest Dates 2005: 7-1-05, 7-6-05, 9-15-05, and 10-10-05
Experimental Design: Randomized Complete Block

Entry (by total yield)	Marketer	Seeding Year (2004) Yield (t DM/a)	Stand 5-5-05 (%)	2005 Harvests (tons DM/a)					Relative 2005 Yield as % of Checks
				6-1-05	7-6-05	8-15-05[1]	10-10-05	Total	
Released Varieties									
REBOUND 5.0	Croplan	4.20	87	2.30	2.15	1.62	1.25	7.31	111
EXTREME	LG Seeds	3.98	88	2.30	2.05	1.67	1.22	7.25	110
6415	Garst	3.94	93	2.40	2.08	1.54	1.13	7.15	108
FSG 408DP	Allied	3.94	91	2.25	2.00	1.74	1.15	7.13	108
FSG 351	Allied	3.94	94	2.17	1.94	1.81	1.19	7.10	108
LIGHTNING III	Jung	4.08	91	2.34	2.01	1.55	1.15	7.03	107
6400HT	Garst	3.93	86	2.15	2.04	1.69	1.15	7.03	107
54Q25	Pioneer	4.11	93	2.24	2.04	1.62	1.11	7.01	106
BOBWHITE	NC+	3.70	81	2.08	1.99	1.63	1.18	6.88	104
54V46	Pioneer	3.92	93	2.18	1.94	1.48	1.13	6.72	102
WL 319 HQ	W-L	3.66	91	2.33	1.92	1.30	1.16	6.71	102
HYBRIFORCE-420/WET	DairyLand	3.86	89	2.08	1.88	1.63	1.11	6.70	102
A 30-06	PGI Alfalfa	3.96	87	2.15	1.85	1.58	1.10	6.68	101
6200HT	Garst	3.73	95	2.15	1.83	1.62	1.08	6.67	101
LEGENDAIRY 5.0	Croplan	3.49	93	2.08	1.86	1.29	1.08	6.32	96
Experimentals									
Wyoming BRR-Resistant		3.89	93	2.10	1.88	1.47	1.09	6.53	99
Checks									
5312		3.46	91	2.24	1.90	1.60	1.14	6.88	104
VERNAL		3.60	94	2.09	1.78	1.58	1.05	6.49	98
ONEIDA VR		3.96	89	2.05	1.82	1.49	1.06	6.42	97
…3 Checks		3.68	91	2.12	1.83	1.56	1.08	6.60	100
Mean		**3.85**	**90**	**2.19**	**1.94**	**1.57**	**1.13**	**6.84**	**104**
LSD (0.05)		0.57	7	0.41	0.23	0.23	0.13	0.75	11

[1]Hail damage occurred on 8-9-05.

Partnership: U of M Forage Program

For additional information:
D. Holen P. Peterson C. Sheaffer
D. Swanson J. Larson

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Managing Plumeless Thistle in Pastures with Donkeys

Plumeless thistle (*Carduus acanthoides* L.) is the most common species of thistle infesting NW Minnesota pastures. In overgrazed pastures this plant often forms dense patches that limits cattle feeding and reduces pasture productivity. Plumeless thistle infestations can be reduced over time with annual applications of herbicides; however, access by spraying equipment to many pastures is limited by steep slopes, rocks, trees, water and other physical barriers. There are numerous references in literature concerning donkeys and their preference for consuming thistle blossoms. The purpose of this research was to evaluate the effectiveness of donkeys in reducing plumeless thistle infestations in established pastures.

In 2003, a three year study was established in a grass pasture with moderate to heavy plumeless thistle populations at Deer Creek, Minnesota. Treatments consisted of 1) one donkey and one cow/calf pair and 2) two cow/calf pairs. Pastures were subdivided into six paddocks with approximately 2.5 acres for the donkey and cow/calf pair and 3 acres for the treatment with two cow/calf pairs. The experiment was a randomized complete block design with three replicates. A permanent series of transect lines were established in each pasture to allow sampling from the same sites each year.

Figure. Differences in plumeless thistle density and flowering at Deer Creek with cattle paddock in upper right and donkey treatment in the foreground

Funding and Partnership Information:
Central Regional Partnership, Staples

For additional information:
Vince Crary Carlyle Holen
Bobby Holder Doug Holen

Managing Plumeless Thistle in Pastures with Donkeys *(continued)*

Table 1. Effects of grazing treatments on plumeless thistle plant number, height and blossom number in 90 sampling areas (10 ft diameter circles) in 2003, 2004 and 2005 at Deer Creek, MN.

	2 Cow/Calf Pairs	1 Donkey and 1 Cow/Calf Pair
2003		
Total number of plants	398	370
Total number of blossoms	6,218	1,628
Ave. P thistle height (inches)	30	27
2004		
Total number of plants	257	265
Total number of blossoms	10,172	1,323
Ave. P thistle height (inches)	35	21
2005		
Total number of plants	603	469
Total number of blossoms	9058	3114
Ave. P thistle height (inches)	24	21

Results after three grazing seasons are providing insight into the effectiveness of using donkeys for managing plumeless thistle in pastures. Some of the observations about feeding preferences include; 1) There are differences between donkeys in their preference for consuming plumeless thistle blossoms. All donkeys in the project grazed on P. thistle but some donkeys have a greater affinity for consuming thistle blossoms than others. 2) Donkeys prefer blossoms over stems and leaves of P. thistle. Donkeys ignore the younger plants and do not begin grazing on P. thistle plants until blooms are present. 3) Plumeless thistle plants with heavy grazing pressure are stimulated to continue to produce additional blossoms. Many of the later blossoms produced by the plant will not produce seed.

Plumeless thistle populations were higher in 2005 compared to 2003 and 2004. We conjecture that the increase in the number of plants in both treatments is due to a very long, wet fall in 2004 that allowed more seedlings to establish. There are fewer plants in the donkey treatment paddocks and it is possible that after two years of reduced seed production at these sites the seedbank is lower than in the cattle only pastures. The number of plumeless thistle blossoms in sampling areas was reduced by 74% in 2003, 87% in 2004, and by 66% in 2005 in the donkey treatment compared to the cattle grazing treatment. Plant height was reduced by 10%, 40%, and 12% in the donkey treatment compared to the cattle treatment in 2003, 2004, and 2005 respectively.

Managing plumeless thistle with donkeys is a long term approach and to be successful, should be coupled with reduced grazing pressure, increased soil fertility and other practices that increase the competitiveness of the desirable pasture species.

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Ryegrass as a Companion Crop in Perennial Forage Establishment

Cooperator: Bryce Stordahl
Nearest Towns: McIntosh MN – Polk County
Soil Type: Markey muck and Hedman loam
Tillage: Cultivation, harrowing 2X, planted with grain drill
Previous Crop: Soybean
Planting Date: 5-7-04
Row Width: Oat: 6" Ryegrass: broadcast
Fertilizer: None
Herbicide: None
Experimental Design: Strip treatments with five samples per treatment

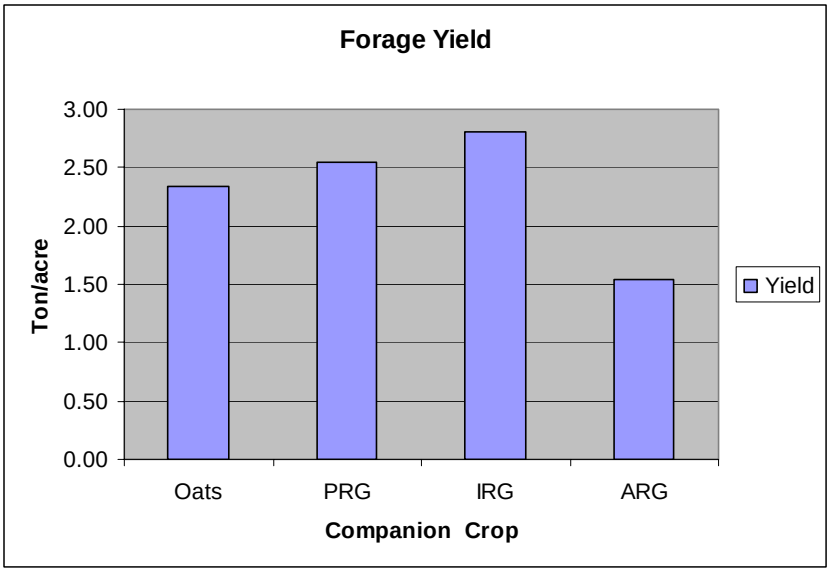
Purpose of Study:

Oat is often used as a companion crop to establish perennial forages despite its rapid decline in forage quality with maturity. Conversely, certain Ryegrass types may offer the benefits of Oat companion crops while maintaining greater forage quality without sacrificing yield. In the USA, grass forages have traditionally been considered inferior roughages because the commonly used Relative Feed Value (RFV) formula tends to bias alfalfa at the expense of grass forages. However, recent advances in new analytical techniques (NDFD, RFQ, Milk2000) more accurately reflect the true feeding value of grasses.

A forage mixture consisting of Red Clover (5 lb/a), Timothy (4 lb/a) and Orchardgrass (2 lb/a) was broadcast in a production field and over-seeded with four companion crops. Oat was seeded at 48 lb/a, three ryegrass treatments (Perennial (PRG), Italian (IRG), and Annual (ARG)) at 8 lb/a. An early mass harvest was taken to eliminate weed seed production and to equalize regrowth. Forty-six days after clipping, the regrowth was hand clipped from five locations within each treatment. Each sample was separated into individual plant species to determine relative proportions and to estimate relative forage yield.

Results

All companion crop species established well and met the expectations of a companion crop. Italian and Perennial Ryegrass yields were similar or slightly greater then oat. Annual ryegrass produced a significantly lower yield ($p>0.10$).



Funding: Polk County Extension Service and Minnesota Agric. Experiment Station
Partnerships: Barenbrug USA and North Central Region SARE

For additional information:
Jim Stordahl and Paul Peterson

Ryegrass as a Companion Crop in Perennial Forage Establishment - *continued*

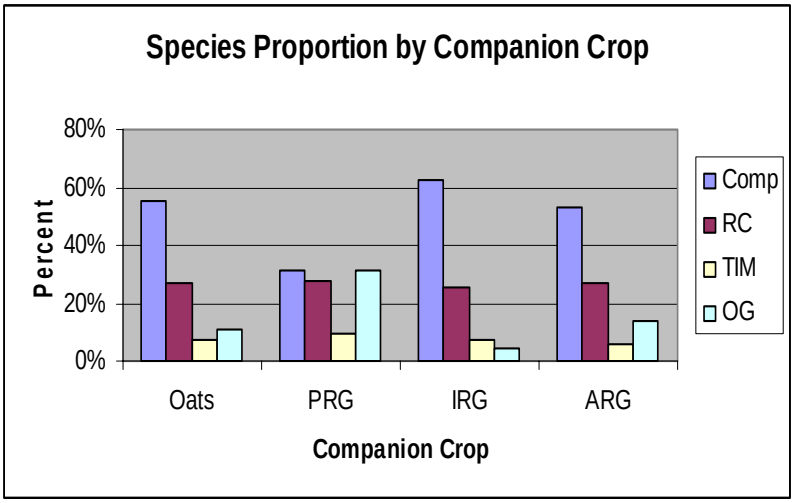
Red clover (RC) establishment was consistent regardless of companion crop. Timothy (TIM) and Orchardgrass (OG) tended to contribute a smaller percentage of the overall yield, regardless of companion crop with the exception of Perennial Ryegrass. This effect may not be typical.

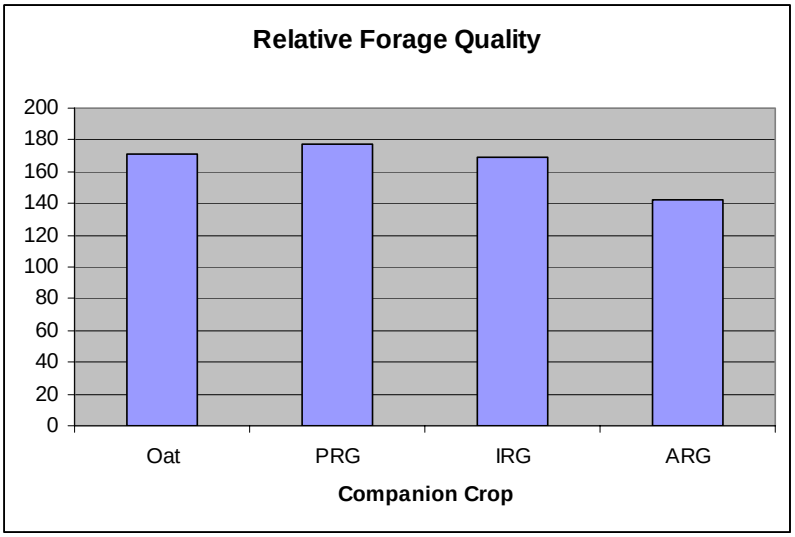
Forage Quality:

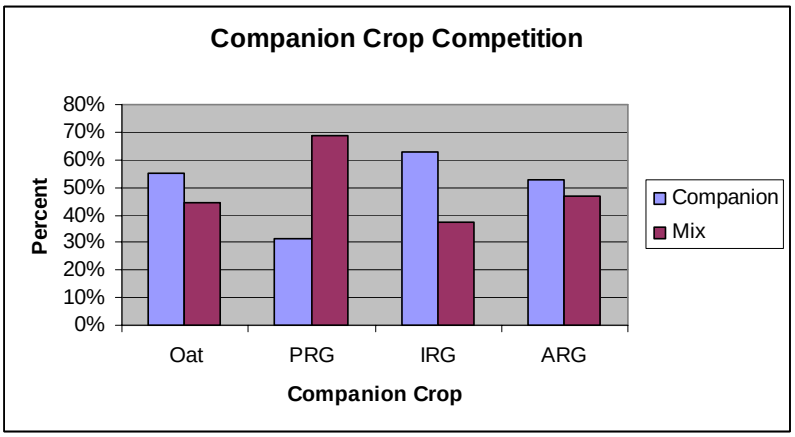
The Relative Forage Quality (RFQ) was excellent on all treatments except Annual Ryegrass. Perennial and Italian Ryegrass remain vegetative during the establishment year while Oat and Annual Ryegrass produce stems and seed heads which reduces forage quality. Since the Oat regrowth has a greater percentage of forage perennials, the RFQ is considerably greater on the second cut. In contrast, Oat RFQ of the first cutting was 131.

Oat, Italian and Annual Ryegrass provided the greatest competition with the forage mixture while Perennial Ryegrass tended to have a greater percentage of the target forage species.

Initial trials using Ryegrass as a substitute for Oat as a companion crop are encouraging. Italian and Perennial Ryegrass establish quickly and produce greater quality forage with greater palatability and similar or superior yield as compared with Oat. Annual Ryegrass initiates reproductive growth rapidly which reduces forage quality. Ryegrass seed is small and shallowly seeded and may be moved by flooded fields before germination. Ryegrass is shorter then oat and provides less shading of weeds.





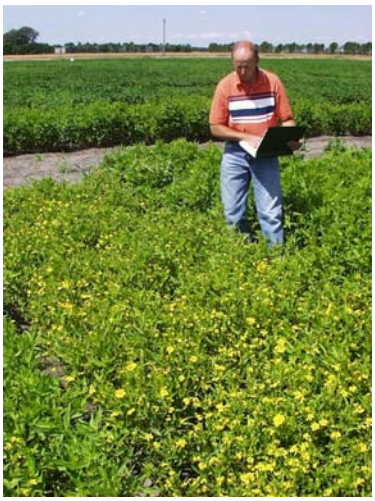


Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Niger Variety Evaluation - Thief River Falls and Roseau

	Thief River Falls	Roseau
Cooperator	Lyle Olson	Richard Magnuson
Nearest Town	Thief River Falls	Roseau
Soil type	Roliss loam	Zippel very fine sandy loam
Previous crop	Barley	Wheat
Seed Bed prep	cultivation 2x	cultivated 2x
Soil test	20 - 18 - 332 - 62	NA
Fertilizer	25 - 65 - 20 - 1	14 - 67 - 39 - 0
Planting date	5-31-05	5-19-05
Row width	6 inches	6 inches
Seeding depth	3/4 inch	3/4 inch
Seeding rate	6 lb / a	6 lb / a
Herbicides	Trust (1.5 pts/a) PPI	Prowl (3 pts/a) PPI
	no post emergent herbicide	Assure II (10 oz/ac)
Swathing date	9-30-05	9-30-05
First Frost date	10-5-05	10-5-05

Purpose of Study:
To evaluate plant height, bloom and yield differences of niger varieties grown in NW MN and combined yield with a similar experiment conducted in 2003 and 2004.



Experimental Design: Randomized complete block with 4 replications

Results:
The variety EarlyBird 50 (used to have research number NS031) bloomed earlier, was shorter, and matured quickest and in Roseau yielded significantly more than all other varieties.

	Roseau			Thief River Falls			Combined[1]
	8-30-05	8-30-05	10-17-05	8-30-05	8-30-05	10-17-05	03-05
Variety	**Plant Height (inch)**	**Bloom (%)**	**Yield (lb/a)**	**Plant Height (inch)**	**Bloom (%)**	**Yield (lb/a)**	**Yield (lb/a)**
EarlyBird	26.3	43	109	26.5	90	145	223
Finch Gold	26.1	20	40	27.8	79	79	184
N951	30.5	21	39	31.8	79	98	159
EarlyBird 50	17.6	100	201	18.5	100	102	189
LSD 0.05	2.5	5	23	3.3	4	23	

[1]Combined data for 6 environments; Langdon ND 2003, Roseau 04-05, and Thief River Falls 03-05. Early frost and cool season resulted in low yields in 2004.

Funding: Northwest Regional Partnership

For additional information:
Hans Kandel, Paul Porter, Dave LeGare

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Effects of Selected Herbicides on Niger - Roseau County

Experimental Site: Magnusson Research Farm, Roseau.
Nearest Town: Roseau
Soil Type: Bearden-Colvin-Fargo
Tillage: Fall chiseled, spring cultivated
Niger Variety: EarlyBird
Seeding rate: 6 lb/a
Planting Date: 8-2-05
Post application: 9-4-05
Row Width: 9 inches
Experimental Design: Randomized complete block with 4 replications

Aim damage to Niger plants on the lower leaves on September 12, 2005

Purpose of Study:

To evaluate the effects of selected preplant incorporated, preemergence, and post emergence applications of herbicides on crop emergence and plant injury when applied to Niger.

Results:

The preemergence application of Valor severely reduced Niger emergence from the soil and should not be used. Treflan caused some minor injury.

Raptor at the 4 oz level caused the most plant damage of the post applied herbicides. There was less injury from Raptor applied at 2 compared to 4 ounces of product, but even the 2 oz rate caused un-acceptable levels of injury. Of the post applied products MCPA had the lowest injury ratings.

Treatment	Chemical	Formulation/ a	Appl Time	Rate	Stand	8-30-05 Injury	9-12-05 Injury	9-20-05 Injury
				(lb/a)	Plants/f^2	(%)	(%)	(%)
Treflan	Trifluralin	1.75 pt	PPI	0.875	6.3	6.7	6.7	3.3
Authority	sulfentrazone	5 oz (dry)	PRE	0.23	3.9	21.7	20	25
Valor	flumioxazin	3 oz (dry)	PRE	0.094	0.03	98.3	98.7	99
Raptor 4 oz	imazamox	4 oz (fluid)	Post	0.031	6.8	0	60	73.3
Raptor 2 oz	imazamox	2 oz (fluid)	Post	0.015	6.2	0	38.3	50
Aim	carfentrazone	0.5 oz (fluid)	Post	0.008	5	0	35	41.7
MCPA	MCPA	0.5 pt	Post	0.25	5.2	0.7	18.3	26.7
Treflan/ Raptor	see above	1.75 pt / 2oz	Pre / post	0.875 .015	6.1	8.3	50	56.7
Treflan/Aim	see above	1.75 pt / 0.5oz	Pre / post	0.875 .008	6	8.3	36.7	60
Treflan/ MCPA	see above	1.75 pt / 0.5pt	Pre / post	0.875 .25	5.7	8.3	20	30
Hand weeded					5.3	0	0.7	0
Weedy					6	0	0	0
LSD 0.05					1.5	4.1	10.5	17.5

Funding: University of Minnesota Experiment Station

For additional information:
Hans Kandel, Kevin Betts, Donn Vellekson, Dave Grafstrom

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Evaluation of Compost Tea Mixture Injected at Planting on Yield and Quality of Organic Yellow Corn - Red Lake County

Cooperator: Bill Langlois
Nearest Towns: Red Lake Falls
Soil Type: Clay loam
Tillage: Tandem Disk, Deep Ripped (summer-fall) and field cultivator (spring)
Previous Crop: Corn/Summer fallow
Hybrid: Pioneer 39D81
Planting Date: 5-31-05
Row Width: 22 inches
Fertilizer: Injected at planting
- Compost Tea (10 gal/a)
- DRAMM-L (3 gal/a) hydrolyzed fish with lactic acid
- 1 gal/a Chilean nitrate (15%N)
- 1 gal/a potassium sulfate

Herbicide: None
Harvest Populations: 34,000 plants/a
Harvest Date: 11-25-05
Experimental Design: Randomized block with 3 replications

Purpose of study:
To evaluate the effect of injecting compost tea + DRAMM-L and trace nutrients at planting time on yield and quality of organic yellow corn.

Results:
There were no significant differences with respect to yield, test weight, protein %, oil % or starch % with injected compost tea mixture (Table 1). Moisture % was the only variable measured that was statistically different. The corn field went through adverse weather conditions with excess moisture and soil compaction which may have negated any effect of the injected compost tea mixture.

Table 1. Yield, moisture %, test weight, protein %, oil % and starch % with and without Compost Tea.

Treatment	[1]Yield (bu/a)	Moisture (%)	Test wt. (lb/bu)	Protein (%)	Oil (%)	Starch (%)
Tea mixture	49.8	22.1	48.4	8.1	5.6	69.6
No Tea mixture	45.9	20.7	48.1	8.3	5.8	68.9
LDS 0.05	NS	1.1	NS	NS	NS	NS

[1]Corrected to 15.5% moisture

Funding: Pembina Trail RC&D

For additional information:
Russ Severson

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Evaluation of Five Flax Varieties, Grygla – Marshall County

Cooperators: Arnold and Todd Stanley
Nearest Towns: Grygla
Soil Type: Kratka fine sandy loam
Tillage: Fall chiseled, spring cultivated
Previous Crop: Wheat
Row Width: 6 inches
Fertilizer: Soil test N 48, P 268, K 350, S 480. Fertilizer applied N 58
Weed Control: Trust (1.5 pt) cultivated 2 times before seeding
Swathing Date: When 80% of bolls were brown between August 12 and 30
Harvest Date: Between September 7 and 14
Experimental Design: Split plot with planting dates as main plots and flax treatments as sub-plots arranged in a randomized complete block with 4 replications.

Purpose of study:
To evaluate 5 flax varieties planted at two dates for height, maturity, biomass yield, and harvest index.

Results:
Norlin was the tallest variety. Carter had the highest biomass production. Second planting date produced more biomass and yielded significantly more than the first planting date. There were no significant differences between the yields of the varieties. York had a higher harvest index compared with Carter and Bethune.

Planting date	Harvest Population per ft^2 (plants)	Plant Height (inches)	70% Bolls Mature August (date)	Flax biomass per ft^2 (gram)	Yield[1] (bu/a)	Harvest[3] Index (%)
5-3-05	18	22.4	22	33.0	10.1	18.6
5-12-05	32	22.2	24	40.8	12.0	17.8
LSD 0.05	**NS**	**NS**	**NS**	**7.6**	**1.2**	**NS**
Treatment						
Carter	25	22.1	26	45.6	11.4	15.5
York	30	21.8	25	32.2	11.3	20.9
Bethune	25	22.8	20	37.2	11.0	17.6
Hanley	26	21.4	15	34.0	10.9	19.1
Norlin	20	23.2	28	35.6	10.8	18.0
LSD 0.05	**7**	**1.2**	**5**	**6.1**	**NS**	**3.2**

[1] Corrected to 9% moisture and 56 lb/bu test weight.
[2] ft^2 is square foot.
[3] Harvest index = 100 x Seed mass / Plant mass.

Funding: Northwest Regional Partnership and University of Minnesota

For additional information:
Hans Kandel and Paul Porter

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Flax Variety Evaluation Under an Organic Production System Fertile – Polk County

Cooperators: Jim and Pat Todahl
Nearest Towns: Fertile
Soil Type: Flaming sandy loam
Tillage: Fall chiseled, spring cultivated
Previous Crop: Soybean
Planting Date: 5-12-05 first planting and 5-23-05 second planting
Row Width: 6 inches
Fertilizer: 3 ton/a turkey manure, fall 2004
Swathing Date: 8-10-05 - 8-19-05
Harvest Date: 8-24-05 - 9-2-05
Experimental Design: Split plot with planting dates as main plots and flax treatments as sub-plots arranged in a randomized complete block with 4 replications.

Purpose of study:
To evaluate flax varieties underseeded with legumes and control plots for differences in maturity, height, biomass, production of flax, legume and weeds and yield.

Results:
The first planting date (5-12-05) yielded significantly more than the later (5-23-05) planted flax. There were significantly more weeds at the second planting date. The legume biomass was low due to poor emergence and competition from the flax and weeds. The hand weeded Norlin yielded 21.3 bushel compared with the weedy Norlin which yielded 12.1 bushel. Carter yielded significantly more than York, Bethune and Hanley.

Planting Date	8-10-05 Brown Bolls (%)	Harvest Population Per ft^2 (plants)	Height at Harvest (inch)	Flax biomass per ft^2 (gram)	Legume biomass per ft^2 (gram)	Weeds biomass per ft^2 (gram)	Total biomass per ft^2 (gram)	Weeds In total Biomass (%)	Yield[1] (bu/a)
Date 1	75	33.8	23.8	45.4	1.0	27.7	74.1	38	18.0
Date 2	38	29.1	23.2	29.4	1.4	33.8	64.5	53	8.8
LSD 0.05	**NS**	**NS**	**NS**	**10.2**	**NS**	**NS**	**9.0**	**13**	**4.8**
Treatment									
Norlin hand weeded[3]	66	34.6	24.3	53.7	0.0	13.0	66.6	19	21.3
Norlin (+Red clover)	56	32.4	24.7	36.7	1.7	29.7	68.1	45	13.3
Norlin (+White clover)	55	32.3	24.1	38.7	0.4	32.9	72.0	48	12.5
Norlin weedy	55	27.5	24.1	35.5	0.0	34.8	70.3	51	12.1
Carter[2] (+Red clover)	54	38.7	23.0	40.7	1.7	29.1	71.4	41	14.4
York (+Red clover)	38	29.7	21.9	31.9	2.0	35.1	69.0	51	11.4
Bethune (+Red clover)	63	25.1	23.4	35.5	2.0	33.8	71.2	49	11.1
Hanley (+Red clover)	68	31.6	22.4	26.6	1.6	37.7	65.8	58	11.1
LSD 0.05	**12.5**	**7.6**	**0.9**	**11.5**	**0.8**	**8.5**	**NS**	**12**	**2.2**

[1]Corrected to 9% moisture and 56 lb testweight.
[2]Carter has a yellow seed coat.
[3]Weeds were controlled until crops started to bloom.

Funding: Northwest Regional Partnership

For additional information:
Hans Kandel and Paul Porter

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Effect of Bio-Control Agents on the Yield of Organic Soybean

Cooperator: Lynn Brakke
Nearest Town: Comstock
Soil Type: Silty clay
Tillage: Fall chiseled, spring cultivated
Previous Crop: Wheat
Variety: S 0 8 - 8 0
Planting Date: 5-25-05
Row Width: 22 inches
Fertilizer: 900 lbs/a of "Cluck" 4-4-2 was applied fall 2003
Weed Control: Row cultivation 3 times
Application date and conditions:

Date	7-7-05	7-26-05	8-5-05
Wind (mph)	7 S	6 N	calm
Temperature	79F	69F	74F

Plot size: 4 rows x 25 feet. Inside 2 rows x 20 feet harvested
Harvest Date: 9-29-05
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
Organic farmers will need to do a risk/benefit assessment and determine if it is economical to spray any organic approved materials to reduce disease and aphid damage to the crop. The objective of this study was to evaluate the height, test weight, yield, protein and oil content of soybean after the application of three biofungicides and one bio-aphid control product compared with a control sprayed with water and a control without any treatment.

Results
During the season the soybean plots were visited on a regular basis. No visual differences in the treatments were observed. No soybean leaf rust was reported in NW MN. A low level of soybean aphids was observed in the field as well as natural predators. Conclusion: none of the treatments showed significant differences when compared with the controls (no treatment at all and water applied on July 7).

Products used:
Ballad™ - Biofungicide based on patented strain of *Bacillus pumilus*.

MicroAF™ - This is a biofungicide formulation with eight different micro-organisms in a liquid material.

Sporan™ - A concentrated blend of plant essential oils (Rosemary oil 17.6% by weight and Oil of Wintergreen 82.4% by weight), acting as a contact fungicide.

MicroAC™ or Aphrid™ - This is a blend of beneficial micro-organisms that impact the growth of the soybean aphid.

Data Table: Effects of treatments on yield and quality of organically grown soybean.

Treatment	Application rate	Application[1] date	9-21 Crop height	Yield[2]	Test weight	Protein	Oil
			(inches)	(bu/a)	(lb/bu)	(%)	(%)
MicroAC	0.1lb/a	2	29.3	54.9	57.9	34.6	18.4
Ballad	8 pt/a	2	27.9	53.9	57.8	34.5	18.4
Control		None	28.9	53.3	57.7	34.8	18.3
MicroAC	0.1lb/a	1	28.5	52.5	57.6	34.9	18.3
Sporan	3 pt/a	1	28.4	52.0	57.6	34.8	18.4
MicroAF + MicroAC	12.8oz/A + 0.1lb/a	1	27.8	51.8	57.8	34.6	18.4
Water control		1	28.3	51.7	57.4	34.7	18.4
MicroAF	12.8oz/a	1	28.4	51.6	57.8	34.7	18.4
MicroAF	12.8oz/a	2	27.9	51.0	57.4	34.8	18.4
Sporan	3 pt/a	2	27.4	50.2	57.7	34.8	18.3
MicroAF + MicroAC	12.8oz/A + 0.1lb/a	3	26.4	50.1	57.9	34.7	18.4
Ballad	8 pt/a	1	29.5	47.6	57.5	34.6	18.4
Average			28.2	51.7	57.7	34.7	18.4
C.V.			6.2	5.6	0.55	0.6	0.6
LSD 0.05			NS	NS	NS	NS	NS

[1]All products were applied with 10 gallons of water per acre. 1 = July 7; 2 = July 26; 3 = Aug 5.
[2] Corrected to 13 % moisture.

Funding: Minnesota Soybean Research and Promotion Council

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For additional information:
Hans Kandel and Paul Porter

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Organic Wheat Variety Evaluation, Fertile—Polk County

Cooperator: Jim and Pat Todahl
Nearest Town: Fertile
Soil Type: Flaming sandy loam
Tillage: Fall chiseled, spring cultivated
Previous Crop: Soybean
Planting Date: 5-6-05
Row Width: 6 inches
Fertilizer: 3 ton/a turkey manure, fall 2004
Weed Control: Harrowing 2 times
Herbicide: None, field is certified organic
Harvest Date: 8-12-05
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
To evaluate spring wheat varieties for yield, protein, test weight, plant height, population, heads, canopy cover and disease, when grown under a certified organic production system.

Results:
Granger out-yielded all varieties but was not significantly different from Alsen. In 2004 Alsen was the top yielding variety at Fertile, out-yielding many of the other tested varieties. Percent heads with scab was significantly different between varieties. In organic production protein premiums can be a major part of the income. Dapps provided the highest protein percentage but was not significantly different from Glenn and Alsen. We observed significant differences in test weight, plant height, population, wheat heads per acre and canopy closure.

	2005 Yield[1] (bu/a)	Protein (%)	Test weight (lb/bu)	Plant Height 7-20-05 (inches)	Plants Population[2] (million/a)	Wheat heads (million/a)	Canopy Cover 6-9-05 (%)	Heads With scab (%)	Scab In head (spikelets)
Granger	42.4	15.0	59.7	32.5	1.46	1.48	86.3	16.8	3.8
Alsen	38.6	15.5	58.2	31.8	1.59	2.03	78.8	20.9	4.0
Knudson	37.7	14.0	58.9	30.3	1.37	1.60	63.8	13.0	2.5
Steele-ND	36.2	15.2	59.7	31.8	1.74	1.66	85.0	20.3	5.6
Freyr	35.5	14.9	58.8	31.0	1.52	1.55	70.0	15.5	2.0
Ulen	35.1	15.1	58.4	31.5	1.56	1.58	82.5	26.3	5.5
Oklee	35.0	15.1	59.8	30.5	1.57	1.66	76.3	16.2	2.5
Walworth	34.2	15.1	60.2	30.3	1.62	1.70	82.5	10.6	1.8
Glenn	33.6	15.9	61.6	32.0	1.69	1.58	78.8	21.1	3.3
Granite	33.6	15.2	60.1	29.5	1.49	1.38	62.5	12.5	4.1
Hanna	32.1	13.9	59.1	33.0	1.74	1.98	71.3	9.4	2.8
Dapps	30.0	16.0	57.4	33.0	1.57	1.66	72.5	24.2	5.5
Banton	29.8	14.5	59.9	31.3	1.63	1.95	68.8	17.6	3.9
LSD 0.05	4.5	0.6	0.7	1.5	0.26	0.3	6.8	6.7	1.3

[1] Corrected to 13.5% moisture.
[2] Stand counts were taken after the second harrowing on 6-2-02.
[3] Wheat heads were counted on 7-20-05.

Partnership: Lake Agassiz Sustainable Farming Association of Minnesota and University of Minnesota

For additional information:
Hans Kandel and Paul Porter

Source: 2005 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2006

Organic Wheat Variety Evaluation with Alfalfa as an Under-story Crop, Comstock—Clay County

Cooperator: Lynn Brakke
Nearest Town: Comstock
Soil Type: Wheatville clay loam
Tillage: Fall chiseled, spring cultivated
Previous Crop: Soybean
Planting Date: The entire plot area was under seeded with alfalfa on 4-28-05
Wheat was seeded 4-28-05
Row Width: 12 inches
Fertilizer: 900 lbs/a of "Creekwood" 5-4-3 was applied fall 2004
Weed Control: None
Herbicide: None, field is certified organic
Harvest Date: 7-29-05
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
To evaluate spring wheat varieties for yield, protein, test weight, plant height, population, wheat heads and leaf disease when grown under a certified organic production system.

Results:
Walworth yielded significantly more than Banton, Hanna and Granite. Walworth was the top yielding variety at Fertile in 2002 and 2003, and at Comstock in 2004. In organic production protein premiums can be a major part of the income Alsen provided the highest protein percent but this was not significantly different from Dapps, Glenn, Freyr, Steel-ND and Granite. We observed significant differences in test weight, plant height, population, wheat heads per acre and disease on the flag leaf.

Variety	2005 Yield[1] (bu/a)	Protein (%)	Test Weight (lb/bu)	Plant Height 7-26-05 (inches)	Plants Population[2] (million/a)	Wheat Heads (million/a)	% Flag Leaf Diseased[3] 7-7-05
Walworth	45.5	11.9	57.8	34.8	1.75	1.71	60.0
Ulen	44.6	12.0	58.9	32.0	1.69	1.58	46.3
Granger	44.5	11.2	57.0	36.8	1.67	1.51	17.5
Freyr	44.4	12.5	55.0	33.3	1.57	1.55	12.5
Oklee	43.2	11.3	60.8	32.3	1.73	1.60	40.0
Steele-ND	43.2	12.3	59.0	32.8	1.76	1.89	21.3
Knudson	43.0	12.1	54.9	29.5	1.55	1.40	8.8
Alsen	43.0	12.9	58.2	31.9	1.66	1.70	31.9
Glenn	42.3	12.6	61.1	34.5	1.72	1.76	31.3
Dapps	41.3	12.8	57.9	36.3	1.63	1.68	13.8
Banton	39.4	12.1	60.0	33.0	1.74	1.64	31.3
Hanna	38.3	11.6	56.4	34.3	1.79	1.69	23.8
Granite	33.1	12.3	54.7	31.0	1.49	1.30	10.0
LSD 0.05	4.9	0.6	1.0	2.1	0.15	0.27	13.5

[1] Corrected to 13.5% moisture.
[2] Stand counts were taken on 6-2-05.
[3] Including leaf rust, septoria and tan spot.

Funding: Northwest Regional Partnership, Lake Agassiz Sustainable Farming Association of Minnesota, AgriPro, and University of Minnesota

For additional information:
Hans Kandel and Paul Porter

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University of Minnesota Extension Service
www.extension.umn.edu

Minnesota Soybean Research and Promotion Council
www.soybeans.umn.edu/home.htm